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CULTURAL RESOURCES ASSESSMENT OF THE HANFORD REACH OF THE COLUMBIA RIVER
SEP 80 D G RICE, M CHAVEZ

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CULTURAL RESOURCES ASSESSMENT
OF THE
HANFORD REACH OF THE COLUMBIA RIVER,
STATE OF WASHINGTON

by
David G. Rice
assisted by Marc Chavez

submitted to
Seattle District, U.S. Army Corps of Engineers
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1. The project area was traditionally covered by a Plateau Indian group called the Wanapam. Remnants of the Wanapam people still reside at Priest Rapids. The Wanapam of today are concerned about the preservation of their traditional cemeteries and fishing areas.
2. There are 166 known prehistoric cultural resource sites in the immediate area of the proposed dam that document the prehistory of the Wanapam and their predecessors.
3. There are numerous historical resources present that have not yet been assessed.
4. The history of the Hanford Reach is essentially the history of the Wanapam Indian people, the Hanford-White Bluffs settlers, and the Hanford project reservation.
5. Prehistoric archaeological sites in an unusually good state of preservation represent a variety of settlement types and span at least 5,000 to 7,000 years.
6. The sequence of prehistoric cultures within the Hanford Reach is similar to that of the larger Middle Columbia Region and represents the Vantage, Frenchman Springs, and Cayuse phases in stratified sites of the Reach.
7. There are seven National Register sites and archaeological districts within the project area. Several additional sites are considered by the senior author to be eligible for nomination.

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EXECUTIVE SUMMARY

This report describes the known cultural resources of the Hanford Reach of the Columbia River. The emphasis of the report is on the description of ethnographic, historical, and prehistoric cultural resources affected by the Ben Franklin Dam alternative and the importance of the sites themselves.

Major findings include:

1. -The project area was traditionally occupied by a Plateau Indian group called the Wanapam. Remnants of the Wanapam people still reside at Priest Rapids. The Wanapam of today are concerned about the preservation of their traditional cemeteries and fishing areas.
2. There are 166 known prehistoric cultural resource sites in the immediate area of the proposed dam that document the prehistory of the Wanapam and their predecessors.
3. There are numerous historical resources present that have not yet been assessed.
4. The history of the Hanford Reach is essentially the history of the Wanapam Indian people, the Hanford-White Bluffs settlers, and the Hanford project reservation.
5. Prehistoric archaeological sites in an unusually good state of preservation represent a variety of settlement types and span at least 5000 to 7000 years.
6. The sequence of prehistoric cultures within the Hanford Reach is similar to that of the larger Middle Columbia Region and represents the Vantage, Frenchman Springs, and Cayuse phases in stratified sites of the Reach.
7. There are seven National Register sites and archaeological districts within the project area. Several additional sites are considered by the senior author to be eligible for nomination.
8. The importance of these cultural resources to Columbia Plateau prehistory is manifold.
 - a. They provide one of the only remaining opportunities to scientifically investigate complete site complexes in order to evaluate the putative functional relationships between sites.
 - b. They provide a rare opportunity to relate an historic people, the Wanapam, to specific prehistoric sites and settlement patterns.
 - c. These cultural resources at the base of the Columbia Basin may be among the most important in order to determine the impacts of changing climate upon prehistoric peoples of the area.

8. (cont.)

- d. The sequences of occupations at these sites as well as the cultural and environmental contents of the sites are critical to interpreting the culture history and process of the Columbia Plateau.
- e. These cultural resources in particular comprise the missing links between the prehistory of the middle Columbia, the lower Columbia, and the lower Snake River regions.

Anticipated impacts upon cultural resources if the Ben Franklin Dam alternative is implemented include:

- 1. Seven National Register sites (2) and archaeological districts (5) would be adversely impacted by the proposed project construction area and reservoir.
- 2. At least 122 prehistoric archaeological sites would be directly impacted within the proposed reservoir area at a normal full pool level of 400 ft MSL.
- 3. Erosion due to wave action, sloughing, fluctuating water levels and stream flow would potentially affect 12 sites located between 401-450 ft MSL around the margins of the reservoir area and another 32 sites located downstream from the damsite to River Mile 339.
- 4. It is likely that a determination of adverse effect upon cultural resources would be made if the project is implemented following the procedures of 36 CFR Part 800.
- 5. Mitigation efforts for the recovery and analysis of archaeological data affected is estimated to amount to 60,000-80,000 person-days of labor. Preservation of the affected sites, however, is the preferred alternative.
- 6. Ancestral Wanapam cemeteries would be affected by the project, but may not involve burial relocations since Wanapam religious beliefs are closely tied with specific places and with the earth itself.

INTRODUCTION

This report constitutes an overview assessment of the cultural resources of the Hanford Reach of the Columbia River in Washington State. The purpose of the study is to provide an up-to-date description of the cultural resources that would be affected by the proposed Ben Franklin Lock and Dam alternative. The Hanford Reach of the Columbia River is the last free-flowing segment of the Columbia River in the United States and contains cultural resource values that are unique and of national significance. This study is limited to existing information relating to the cultural resources of the study area and emphasizes the location, known characteristics and significance of the cultural resources identified. In the event of project implementation further studies would be required to provide detailed site descriptions, and site-by-site evaluations and recommendations based upon systematic surface investigations and subsurface test excavations. The probable effects of the Ben Franklin lock, dam, and reservoir are generally discussed in the present study.

The study area of the Ben Franklin Dam alternative is defined in an earlier study by the U.S. Army Corps of Engineers (1969). The dam site would be located at the lower end of Wooded Island at River Mile 348, approximately 10 miles upstream from Richland, Washington. The reservoir at normal full pool level would be at an elevation of 400 ft above mean sea level (MSL) and create an impoundment extending nearly to Priest Rapids Dam at River Mile 397. Based upon personal observations at other dams along the Columbia and Snake rivers, it is likely that water fluctuations below the proposed dam would also affect sites located immediately downstream. Therefore, the study area for this project is extended southward to River Mile 339 at Richland, Washington (Fig. 1).

The major sources of information used for the present study are derived from the professional literature for the region and from records checks at State archaeological depositories and records centers at the Washington Archaeological Research Center in Pullman, University of Washington in Seattle, and the State Office of Archaeology and Historic Preservation in Olympia. Of equal importance to this study was a detailed personal knowledge of the study area of the senior author and reference to his unpublished manuscripts pertaining to the study area. Other research materials were derived from the Smithsonian Institution, Oregon Historical Society, and the Mid-Columbia Archaeological Society.

Field examination of the cultural resources of the study area was limited to sites near Richland, Vernita Bridge; confirmation of earlier field studies (Rice 1968a, 1968b) has been accomplished through archaeological field work conducted by the senior author for the Washington Public Power Supply System (Rice 1973, 1978) and the U.S. Department of Energy and its forerunners (Rice 1976).

The conclusions of this study are based on the best available information. The level of knowledge about the specific cultural resources identified, however, is not great and is bound to change with ongoing and future studies.

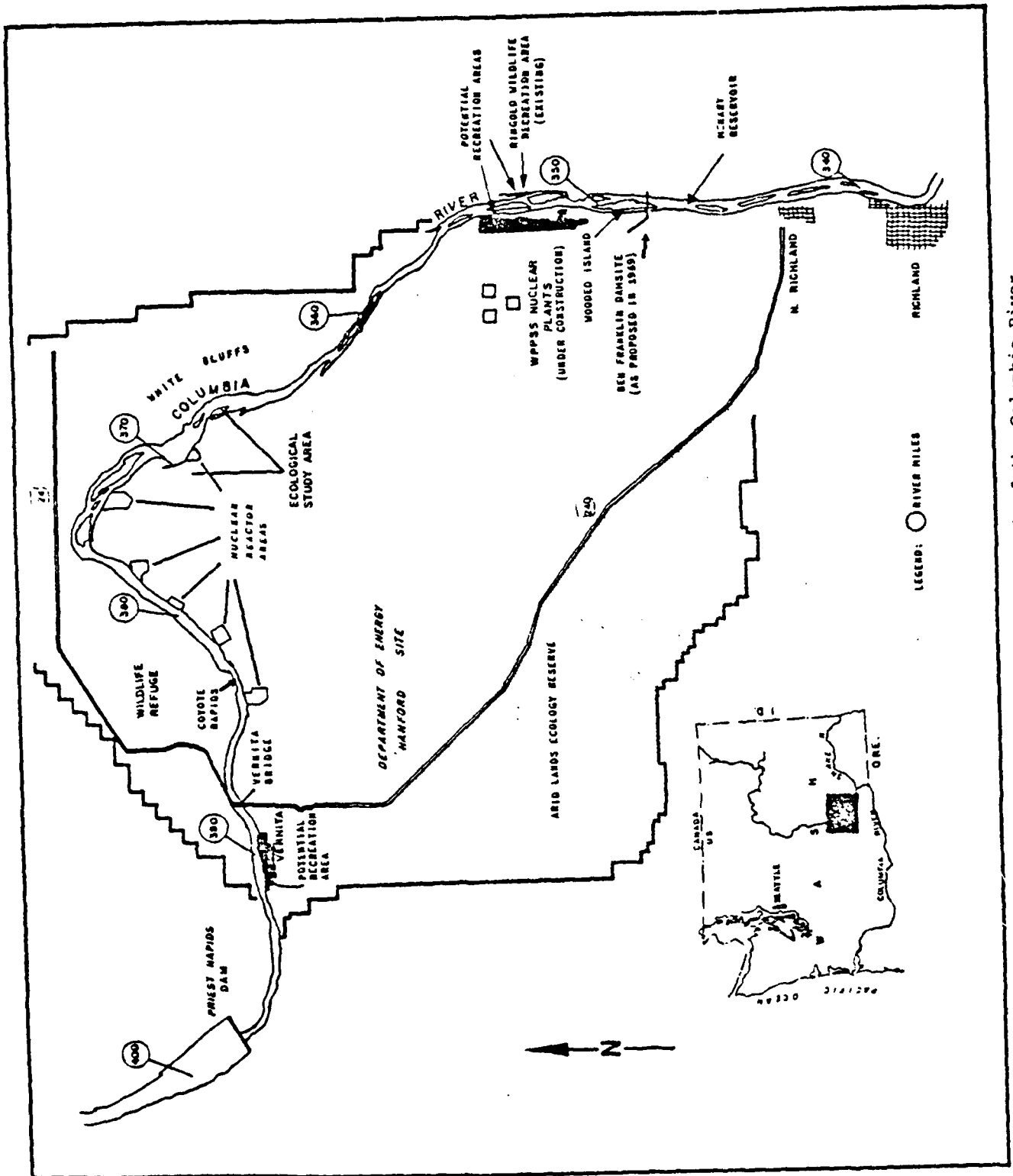


Fig. 1. Map of the Hanford Reach of the Columbia River

Subsurface excavations have been conducted at only eight sites out of 122 sites identified within the primary impact area. Chronology and cultural sequence are worked out only to rudimentary levels.

In examining the literature of the study area it was apparent that definitions of an archaeological site have changed, even in recent times. In H. W. Krieger's (1927, 1918a) time a site was defined as an open campsite, housepit village, rock art rockshelter, or burial. By the time of Rice's (1968a) study, additional site types recognized included fishing stations and flaking floors. Since then sites have been defined on more particularistic grounds in some cases being based upon the occurrence of a single projectile point found on the surface (Smith and others 1976). In the opinion of the senior author sites should not be defined on the basis of isolated surface finds, but should require a stratified context, if not an accumulation of cultural material.

The definition of a site and other related terms that are used here are as follows:

Archaeology: the scientific discipline responsible for recovering, analyzing, and interpreting the unwritten portions of the human historic and prehistoric past, thus contributing to our understanding of the present and to our ability to prepare for the future.

Artifact: a material object made or modified in whole or in part by humans. Among the most common artifacts found at archaeological sites are stone tools, bone implements, shell ornaments or textile fragments.

Cultural resources: objects and areas made or modified by humans and the data associated with these artifacts and features. These resources rest in or on the ground or they may be submerged. Any alteration of the land surface destroys the associated information and endangers the artifacts themselves. Cultural resources may be historical or prehistoric in character and they are protected by various laws.

Cultural resources assessment: an evaluation of the archaeological resources present in an area, their scientific and/or humanistic (heritage) significance, and the level of labor required to protect or properly investigate them.

Feature: an area in or on the ground where evidence of past human activity can be seen or detected. Among the most frequent features at archaeological sites are fire pits, storage pits, burials, house floors, and post holes.

Historic archaeology: the study of archaeological sites pertinent to recorded history which combines historical archival research, oral history, and archaeology to clarify and document historic events and places.

National Register of Historic Places: a listing maintained by the U.S. Department of the Interior (Heritage Conservation and Recreation Service), of architectural, historical, archaeological, and cultural

sites or districts are nominated to the Register by the State historic preservation officers and by federal agencies and are evaluated and approved by the National Register staff. Sites listed on the National Register or which are determined eligible for listing are protected by the provisions of Section 106 of the National Historic Preservation Act.

Prehistoric archaeology: the study of the unrecorded past as it is reconstructed by inference from sites, features, and artifacts recovered from systematic surface observations or site excavations.

Site: any area or location occupied as a residence or utilized by humans for a sufficient length of time to construct features, or deposit a number of artifacts.

Site complex: geographically associated sites which are of the same general age, which are functionally diversified, and which may have been used concomitantly for different purposes by a single group of people. Most often Columbia River site complexes are clustered around the focus of a winter village and include such things as storage pits, caches, rock art, burial sites, and sweat lodges. The site complex is hypothesized to correlate with ethnographic settlement patterns.

ETHNOGRAPHIC OVERVIEW

The first people within the study area were recorded by Lewis and Clark on their expedition to the Pacific. When they reached the mouth of the Snake River (Lewis River on their maps) they traveled north on the Columbia as far as the mouth of the Yakima River (Thwaites 1959). The Indians who were encamped there, for the purpose of collecting salmon (in October 1805), drew a map of the Columbia River which lay farther north. Captain Lewis took a vocabulary of a people who called themselves the *Sokulk*, who lived on that portion of Columbia River north of its Junction with *Tape-tett* (Yakima River) (Fig. 2). Lewis and Clark also noted the population of the *Sokulks* at approximately 3000. It should be stated that even as early as 1805 the Indian population of the Pacific Northwest had already suffered great reduction by disease brought in by the earlier explorations of Euroamericans along the coast, so it is quite probable that the 3000 *Sokulk* that Lewis and Clark note are a remnant of a much larger group (Relander 1956).

The *Sokulk*, who are known ethnographically as the *Wanapam*, lived almost exclusively within the study area. The contemporary *Wanapam* state that they have lived there since time immemorial. Verne Ray (1939), the Plateau ethnographer, places the *Wanapam* in the Sahaptian linguistic stock with the Yakima Indians. They belong to a cultural group labeled the Northwest Sahaptians, whose political structure was based on the village grouping rather than upon tribal social organization. The tribe, Ray felt, was in any literal sense absent from the Columbia Basin (Ray 1936).

Ray (1939) saw these village groupings bonded together through ties of common habitat, interest, customs, values, religion, and, to some extent, dialect of language. Ray also felt that intervillage marriage seemed to create a group sense larger than the village, but one that never superseded the village in political importance. In his 1936 work, Ray listed five villages for the *Wanapam*, extending from the Priest Rapids north. This area is the northwestern portion of "*Wanapam territory*" and was admitted as an incomplete list (Fig. 3). Another listing of villages and place names is given by Relander (1956) who obtained them from the few remaining *Wanapam* at that time. (Table 1).

The ethnographic *Wanapam* lived a life typical of the peoples of the Columbia Plateau. The *Wanapam* year was divided into six seasons. These seasons were based not only on the periods of the earth's rotation around the sun, but on the arrival of animals and the maturing of plants used by the *Wanpams* in their seasonal rounds. The listing of the seasons given here is one connected with the Dreamer faith of *Smohalla* (Relander 1956:74-75):

1. *Yehku Keelah*: Begins with the winter solstice and the *Wanapam's* winter religious dances. It is the beginning of the new year.
2. *Tzinbuk*: Its meaning has been lost.
3. *Aham Mi*: Refers to Crow Coming.

Fig. 2. Lewis and Clark's 1805-06 map of the Columbia River showing the Sokulk people within the study area (Preston 1974).



Fig. 3. Wanapam ethnic group location (from Ray 1936).

WANAPAM VILLAGES

1. p'mna".

Located on the west side of the Columbia River at Priest Rapids.

2. ca'p'tul.k.

About two miles upriver from no. 1, on the same side.

3. waya'nwe.

About one mile north of no. 2, on the west side.

4. tamacsk'uni'skuni.

One mile north of no. 3, same side.

5. xa'txamtcanuwi'tac.

One mile above no. 4, same side.

4. *Hish Hish*: Was named for a small insect that gathers in swarms like mosquitos or gnats.
5. *Shihtash*: Refers to time to move out to the root digging places.
6. *Yakahtash*: Is fall fishing time. It continues until the cold weather and the sun comes back to the beginning of the Wanapam year.

The seasonal round of the Wanapams is not well documented because none of the detailed ethnographies dealt with the non-religious aspects of these people. In the spring after the fish runs the Wanapam used to leave the Columbia River Valley in search of the root crops (like camas and kouse) which would be maturing in the uplands west of the Columbia River. By midsummer the Wanapam used to camp in the foothills and hunt various forms of game for their summer sustenance (both small game such as rabbit, and large game deer and elk for example). With the ripening of huckleberries (Grouse Whorttleberries) the Indians would turn back to the river for the beginning of the fall fishing time. These fish runs extended late into the fall and by their conclusion the Wanapam usually had enough fish to last the winter. The winter solstice was one of the most important times for the Wanapam, for it was the time of the winter spirit dance. The bird *Wowshuxk luh* (knocking off berries with a piece of stick) begins to sing on the shortest day of the year and in time calls all the birds, roots, salmon, and all living things to begin growing so the Indians will have new food (Relander 1956). *Wowshuxk luh* talks for six months until the sun turns around. Puck Hyah Toot, "the last Prophet" has identified *Wowshuxk luh* as Bul-loxk's oriole, which arrives in the area in late spring, one of the last migratory birds to arrive in the area (Relander 1956).

The major ethnographies of the Wanapam are works by Spier (1935) Mooney (1896), and Relander (1956). Unfortunately these works are primarily concerned with the Ghost Dance Religion and the Prophets Smohalla and Co-taia-kin, not with the general cultural traditions of the Wanapam. With respect to the teachings of Co-taia-kin and Smohalla, Mooney's work is a record of their interactions with the United States Government and a description of their doctrine and related ceremonies. Both Mooney's and Spier's work places the Dreamer Religion into a larger framework, embracing many different late nineteenth century Indian Prophets in the West and Northwest. Relander's work is a more personal work on the Dreamer Religion and the Wanapam people based on native informants instead of the documented accounts of government agents as in Mooney.

Today some of the Wanapam people still live at Priest Rapids, but many have moved away to the Colville, Umatilla, or Yakima Reservations. Those who remain at Priest Rapids have faithfully preserved the traditions of the Dreamer Religion (Relander 1956, Rice and Feinstein 1973). These people also retain strong concerns for their fishing rights (Swindell 1942) and the cemeteries which contain the remains of their ancestors (Rice and Feinstein 1973).

TABLE 1

List of Wanapam villages and place names (Relander 1956:287-310)

1. *Wallula* was the southernmost Wanapam village.
2. *Pasco* is near the old village the Indians called *Kosith* (at the point of land). It was one of the largest villages along the Columbia and was on the north shore at the confluence of the Snake with the big river a mile below the present city of Pasco.
3. *Kosith* was famous as an eel fishery.
4. *Shimloot* was the Wanapam name of the first island in the Columbia above the mouth of the Snake River. The meaning is unknown.
5. *Kowit Kowit*, half a mile upstream from *Kosith* was another village site. The meaning of the name has been forgotten.
6. *Kennewick*, across the Columbia southwest of Pasco, was occupied by family bands. It was called *Anhwash* by the Wanapams.
7. *Anhwash*, besides being the old Indian name for Kennewick, was the name for the island just upstream from the car bridge over the Columbia.
8. *Pos Pos*, a dwelling place a short walk upstream from the island, was where a variety of willow grew that was used to make *posch*, a medicine for colds and chills.
9. *Tomnosh*, on the east shore of the Columbia, was across from the old village of *Chamna* at the mouth of the Yakima. Across the Yakima River from *Chamna* was the hot spring, *Tinup Pepe*.
10. *Akachpah* was a small island opposite the present city of Richland.
11. *Tola Tcpepeia* was an ill-smelling spring eight miles from Pasco, near Richland, between the Columbia and Yakima Rivers.
12. *Chamna*, at the junction of the Yakima River where it flows into the Columbia from the west, was the home village of the Chamnapums, almost identical with the Wanapams and speaking the Wanapam language. *Chamna* was twelve miles downstream from the Horn on the Yakima River, a fishing place since ancient times called *Wanawish* (rock dam fishing place).
13. *Richland*, upstream from *Chamna*, was called *Ahowpa* (Sticks), and the river at the place was *Towmowtowee* (water pulls down). It was a winter camp.
14. *Shuwipa* was an island four miles upstream from Richland.
15. *Sekema* was eight miles upstream from Richland and was a favorite fishing place after the salmon had finished spawning.

16. *Thilchpa* (Desert Sand Place), a stretch along the river between Richland and Hanford, was one of the few places where there were no permanent villages.
17. *Hanford*, called *Charout* (water whirls around), was one of the principal Wanapam camps.
18. *Wowchtch* (waters go up), a short way upstream from Hanford, was an incidental camp. It was one of a series of almost continuous villages between Hanford and White Bluffs.
19. *Poughpowosth* (white powder) was a mining site, upstream from Hanford where the Wanapams procured face paint for the midwinter dance when "sun-turns-around."
20. *Towshoupa* (Like Sagebrush) was three miles upstream from Hanford.
21. *Wakwalkkh* (Like a Seive) was the next village.
22. *Poughpowpow* (Spilled Powder) was close by *Wakwalkkh*. It is a place name only.
23. *Tohoke* (Pulling Tops Off Weeds) was a small village.
24. *Pitsumsum* (Calking or Chinking) was a location upstream from *Tohoke*.
25. *Kluptkluptmin* (Melting Snow) was a small island.
26. *White Bluffs* (*Tacht*) was an old home site of the Wanapams, one of their principal sedentary villages, and was named for the white bluffs along the east bank of the river.
27. *Y'yownow* (Make Dry Salmon) was where the Wanapam salmon drying racks were built. Here cellar caches were dug in which to store the fish, the long hemp nets and stone sinkers and other possessions.
28. *Wyone*, bordering on *Y'yownow*, was part of the fishery site and it was named for the type of current in the river.
29. *K'watch* (Locke Island) was north of the old Wiehl Ranch, near the east bank. There was an extensive graveyard on the island in early days; the last burial there in 1912.
30. *Seesee* was a smaller island toward the east bank.
31. *Watklimpt* (Water Covers Over) was a small island toward the west bank, so named because it is covered at high water.
32. *Chawyma*, three miles from *Watklimpt*, was a fishing village.
33. *Nooksiah* (Otter) was the name of the flat-topped Gable Mountain near the river above White Bluffs, northeast of Smowhala's dream mountain, *LaLac*. It was one of the three principal places along a hundred-mile stretch of the river where boys and girls were sent on their spirit quests.

34. *Wahluke* (Soaring Up Like Birds), on the north bank of the Columbia, was in later days a town of small consequence. It was the name for the rising slope, back from the river. The Wanapam name for the place *Wahluke* was *Wanuke* (Going On Foot Up Hill).
35. *Moolimooli* (Little Stacked Hills), three miles upstream from the island, *Watklimpt*, was a dog-salmon fishing place.
36. *Coyote Rapids*, a mile from *Moolimooli*, was called *Moon* (Water Swirl Place) and was the place where *Smowhala* held his first *Washat* or *Dreamer* dance. This was held in a long house on the right shore. The Indians lived there in the winter because of the abundance of driftwood.
37. *Ahtilcum*, another large village, was upstream from *Moon*.
38. *Ahnukwhum* (Sits Down After a While), two miles from *Ahtilcum*, was a summer camp where fish were caught and dried. It was located along *China Bar*.
39. *New York Ranch*, on a flat along the hillside at this place, almost in the shadow of several basalt spires, were burial places of the villagers a century and a half ago.
40. *Watashmahloat* (Raft Stuck) was half a mile upstream from the pillaged burials. There is a cave in the hillside where the people stored dried salmon because it was cold and would keep the year around without spoiling.
41. *Monwowie*, a camping place near *McCoy Canyon*, has no meaning that could be interpreted. At this place the men waited while the women went into the hills to dig roots.
42. *Priest Rapids*, a large village called *P'na*.
43. *Wotklocht* (Holes in Rock), a salmon-fishing place. Just upstream was the small island called *Anhyi* (Sun Man).
44. *Almuscl Almonwie*, was half a mile upstream and opposite the island, *Anhyi*. There is a narrow race in the river, called *Whale Chute* in later days. During the spring salmon run when the big *Chinook* salmon came leaping upstream through the fast water, some of them would land on the island in a shallow, stone depression where the Indians clubbed them to death.
45. *Chalwash Chilni* (One-Legged Abalone Man) is the large island in the river at *P'na* (Fish Weir). It is one of the two *Priest Rapids* dam sites.
46. *Shoptalok*, at *P'na*, is a small cave marked by a single rock painting, a home of the Little People who were mischievous, evil spirits. It is the last village site of the Wanapams where they hold their ceremonial feasts in the last tule-mat long house along the Columbia.

47. *Weyounwe* (Points in the River Where Water Goes Up) was a mile upstream. The long-sacred Wanapam graveyard (*stratsa*) is near there on a bluff--a graveyard now marked as a burial place and protected by law.
48. *Towmash Koonishines* (Place of the Whirlpool) was the next upstream camp. Indians lived here both winter and summer.
49. *Towtomchana Wetosh* (Place Where Deer Fall Down) was the next site.
50. *Tentutnamah* (Willows Around Here) was half a mile upstream. The willows were the kind from which the people peeled bark and boiled it to make a medicinal drink.
51. *Wapixie* (Water Drops Fast) was near the head of the first riffles in Priest Rapids.
52. *Beverly Gap* is the gap in Saddle Mountain, called *Lekashtum* (a Kind of Gap), ten miles upstream from *P'na*. The name Sentinel Buttes is sometimes applied to the gap.
53. *Iques* (Cottontail Rabbit), above the head of the first riffle, so named because the whitecaps resemble rabbits scurrying for cover.
54. *Crab Creek* (*Tahosas*, Indian Hemp) flows into the Columbia from the east along the north foot of Saddle Mountain. Hemp grew along the stream in such profusion that before historic times Indian bands fought for possession of the grounds.
55. *E Sut Lee* (One Sided) was the name for the Wanapum Dam Site. It is descriptive of the location, the river being flat on the Grant County shore and steep on the Kittitas side. This was a camping place on trips up and down the river and up Hanson Canyon toward Ellensburg.
56. *Vantage*, at the bridge on the Ellensburg-Spokane highway, was called *Panko* (Small White Food Root). There are many petroglyphs along the Columbia here--paintings which the Wanapams say were made by the Little People and the Ancient People.

ARCHAEOLOGICAL OVERVIEW

The first professional archaeological investigation of the study area was conducted by Harlan I. Smith (1905) for the American Museum of Natural History in 1903. His study addressed the Yakima Valley from Cle Elem to the mouth of the Yakima at Richland, the area between the mouths of the Yakima and Snake rivers, and land in the vicinity of Priest Rapids. Only the last of these areas is directly involved in the proposed Corps project.

Archaeological investigations continued on the Columbia, and other major rivers in the area, but no work was done in the study area until H.W. Krieger, then Curator of Ethnology in the U.S. National Museum (a division of the Smithsonian), performed a survey of the Columbia River from the mouth of the Yakima River to the Okanogan for the Bureau of American Ethnology. Over the field seasons of 1926 and 1927 (Krieger 1927, 1928a), Krieger acquired access to collections of artifacts from the area and site location data from the Columbia River Archaeological Society and local collectors. He then field checked many of these settlement locations and tested eight of them. One of these sites was an Indian village at Wahluke (45-GR-306a,b,c) (Krieger 1928b). At the time this large village had not been disturbed in any way by collectors, and excavation showed that the site was entirely pre-contact in its content. Krieger (1928a, 1928b) described in detail types of burials, their condition and accompanying artifacts and animal bones as well as cultural material found on the surface. It should be noted that Krieger felt that a thorough study of the archaeological record in the area was imperative because many of the benches containing important prehistoric sites were also prime areas for the development of orchards. No follow-up investigations were undertaken and countless sites have been lost through development and/or vandalism by local collectors. Krieger's studies (1927, 1928a, 1928b) were the first truly scientific studies of the project area.

Following Krieger's work no further work is documented for the area until Philip Drucker (1948) wrote an *Appraisal of the Archaeological Resources of the McNary Reservoir, Oregon and Washington*, for the Columbia Basin Project--River Basin Surveys of the Smithsonian Institution. His report gave Smithsonian-type designations to the first 20 to 50 sites in four counties: Umatilla, Walla Walla, Benton, and Franklin. The upper end of the survey (actually conducted by C.E. Smith and F. Fenenga) included the Richland area. Most of this portion of the river is on the margin of the project area, but would potentially be impacted by water level fluctuations below the proposed Ben Franklin Dam (some of the sites he found are located within the proposed reservoir area).

In July 1947, Francis A. Riddell visited a Wanapam village (45-BN-157a,b) which had been taken over by the U.S. Army Corps of Engineers in 1943 when the Hanford Engineering Works was established in the area. As the Wanapam were not in residence--and were not allowed back--their possessions remained behind to be scattered by "irresponsible whites" (Riddell 1978). The records of his visit give a clear picture of at least the dwellings of the Wanapam people in that area in the early 1940's.

Joel L. Shiner (1951) published a report concerning the then proposed Priest Rapids Dam and, like Drucker, provided the first Smithsonian site designations for that area. Shiner systematically covered the riverbanks upstream from the present study area. The project area abuts on the north-western boundary of the current study (Shiner 1951).

In a survey for the State Highway Department in 1953, Bruce Stallard discovered an "Indian cemetery" (45-GR-69) near the Columbia. Relic collectors had desecrated the site and the road construction destroyed what was left (Stallard 1958).

Up to this point, except for the survey done by Krieger in 1926-27, all of the surveys on this portion of the Columbia River were centered on areas other than the Hanford Reach. In 1967-68, the senior author of this report supervised a survey of those lands which would be impacted by the construction of the proposed Ben Franklin Dam. His survey from the site of the proposed dam, several miles upstream from the city of Richland to the Priest Rapids Dam, was the first survey to focus on the Hanford Reach. One reason for the lack of previous surveys of this portion of the Columbia is the fact that much of the area involved is part of the Hanford Reservation which was formed in 1943 and was restricted to public access. Rice (1968a) recorded 105 sites, and in a later survey (Rice 1968b) he recorded 17 more sites on the Columbia River, 4 in the Ben Franklin Dam project area and 13 immediately downstream from the dam site where water level fluctuations would erode sites should the dam be built. These surveys finally tied this portion of the Columbia into a framework of archaeological studies begun 40 years earlier on this reach of the Columbia River (Rice 1968a, 1968b).

Archaeological work in this area now takes on a different perspective. Earlier work was comprised of surveys of broad scope, covering large areas, while later studies focused on smaller scale project areas. In 1973, Dr. Rice conducted archaeological investigations near the WPPSS Hanford #1 Nuclear Project (Hanford Generating Plant), and found two more sites along the riverbank of the Columbia (45-BN-179 and 180). Continuing his work in the area, Dr. Rice (1976) produced a detailed report on a "Log Structure at White Bluffs Landing" (45-FR-266). All-in-all, Dr. Rice has recorded 117 of the 166 sites listed for the area concerned.

In 1976 the reports of many small projects were published concerning the project area. Glenn D. Hartmann and Jerry R. Galm (1976) conducted a survey of oil and gas lease areas on the Columbia and Vantage rivers and recorded/updated records on four sites (45-BN-158, 45-GR-69, 164, 320). Harvey S. Rice (1976) in a survey of Esquatzel Coulee Block 26 and the Bacon Siphon and Tunnel Projects recorded a badly disturbed site several miles below the Priest Rapids Dam in Grant County (45-GR-326).

Gregory Cleveland and others conducted an *Archaeological Reconnaissance on Mid-Columbia and Lower Snake River Reservoirs* (1976). This study for the Walla Walla District, U.S. Army Corps of Engineers has been the only thorough inventory of sites in the area, and unfortunately ended near the downstream terminus of the present study. A recent reconnaissance was a transmission line study done by J. Brantley Jackson and Glenn Hartmann (1977). They provided an intensive field reconnaissance of a portion of the river involving

both riverbank and Ringold Island. Their survey located nine new sites and reassessed one previously recorded site. It is believed that this occurrence will be found to be common on the Columbia due to the concentration of cultural material and length of time that aboriginal populations have used the area. A.J. Lynch (1976) excavated areas in and around 45-BN-221, one of the sites recorded by Jackson and Hartmann (1976). She identified at least "one seasonal prehistoric campsite of short duration" and "at least two" historic Indian burials.

Archaeological monitoring of the Washington Public Power Supply System's WNP-1&4 pumphouse water intake led to the discovery of a small prehistoric hearth area (45-BN-257) (Rice 1978).

Current archaeological studies within the vicinity of the project area are limited to ongoing power transmission line surveys mostly associated with the A.J. Ashe Substation and with ongoing projects of the U.S. Department of Energy and the Washington Public Power Supply System.

THE HISTORY OF THE HANFORD REACH

In August of 1788 the ship *Washington* out of Boston, captained by Robert Gray, reached the Northwest Coast near the forty-sixth degree of north latitude, where she nearly met disaster trying to enter the mouth of the "opening." The Columbia River was not recognized. Gray circumnavigated the globe (a first for a United States vessel) and returned to the Northwest Coast to trade and explore in 1791. In 1792, after wintering and exploring to the south, Gray met with Vancouver near the Straits of Juan de Fuca, told him that at north latitude 46°10' he had encountered the mouth of a large river. Vancouver had just finished an exhaustive survey of the coast and had recorded an "emphatic disbelief" as to the existence of "any safe port or large river along the part of the coast examined by him" (Symons 1882:87).

After parting with the English ship, Gray sailed along the coast to the south, determined to solve the question of the existence of the river. He went first into a safe and commodious harbor, now known as Gray's Harbor, and on the 11th of May he entered his desired port, running in, with all sails set, between the breakers (which had been pronounced impassable by Meares and Vancouver), and came to anchor in a large river of fresh water, ten miles above its mouth. He afterward, keeping along the northern bank, proceeded up the river for twelve or fifteen miles further, at which point, having taken the wrong channel, he turned back and spent a week in vain attempts to get back to the sea before he succeeded. On leaving the river, Gray gave it the name of his ship, the *Columbia* (Symons 1887:88).

This was an important fact in the dispute over the United States-Canadian boundary.

Exploration and trade with the Indians were paramount in the Northwest in the late 1700's and early 1800's, and the Columbia River was one major route into the interior. The reach of the Columbia that concerns us was, for the most part, explored by men coming overland from the north and east or coming from the west coast, primarily from the mouth of the Columbia. In 1805-06 Lewis and Clark (Fig. 2) came down the Snake River and up the Columbia as far as the mouth of the Yakima, but continued no farther north along the Columbia (Coues 1893:635-644). In 1811 many explorers traveled through the Columbia River Valley. Wilson P. Hunt led an expedition overland for the Astor Company, which began in October of 1810 and reached the Columbia near Umatilla in January 1812. David Thompson of the Northwest Company also started west in 1810, and in hopes of beating Astor's parties came down through Canada along the Kootenai River to the Upper Columbia (Glover 1962). His party passed through the Hanford Reach in the spring of 1811, planting flags and building huts on their way down the river. They passed through the Hanford Reach ahead of Astor's party and planted a pole at the mouth of the Snake River in July of 1811. Upon reaching the coast they found the Astorians ahead of them, already settled in, having arrived by ship in March 1811 (Symons 1887:90; Glover 1962).

Eight days after Thompson's arrival at Astoria, Mr. Robert Stuart, one of the Astoria partners, traveled upriver, arriving in the project area later that summer (Franchere 1969).

Gabriel Franchere, an employee of the Northwest Company, noted during one of his visits to the area several years later:

On the 18th (April 1814) we passed the Priest Rapids, so named by Mr. Stuart and his people, who saw at this spot, in 1811, as they were ascending the river, a number of savages, one of whom was performing on the rest certain aspersions and other ceremonies, which had the air of being coarse imitations of the Catholic worship (Franchere 1969:344; Symons 1882:90).

Alexander Ross and Ross Cox both passed through the Hanford Reach that summer as well, on their separate ways up river (Ross 1904:142-3; Cox 1957). The river provided a major pathway between the coast and the interior of British Columbia, as well as the eastern United States, and remained well traveled through the historic period.

The War of 1812 caused several changes in the then "jointly" held territory. Astor's Pacific Fur Company, an American venture, was incorporated into the Northwest Fur Company, a British holding, setting up the competitive relationship between that company and the Hudson's Bay Company.

In 1818 the Northwest Fur Company established Fort Nez Perces at the mouth of the Walla Walla River as a headquarters for fur trading east of the Cascades. In 1821 the two rival companies merged, and the enlarged Hudson's Bay Company alone took on the private parties interested in a share of the fur trade in the Northwest. The competition between the fur trading companies in the second decade of the 1800's had attracted attention in the populated centers in the eastern United States as well as in Canada and England. With the absorption of the Northwest Fur Company in 1821, the Hudson's Bay Company had a virtual monopoly on the fur trade in the area and extended its livelihood in the area for some time (Chance 1973).

Access to the Pacific Northwest was almost entirely based on the use of forts and trading posts, largely held by the British, as way stations. Fort Walla Walla (old), as Fort Nez Perces came to be known to the Americans in the 1830's, was the closest trading post to the study area. Agents of the United States, mainly officers of the Army Corps of Topographical Engineers (Commander C. Wilkes and Captain John C. Fremont, for example), visited such establishments in their explorations. When traveling through the area, these explorers, as well as the other early travelers, went west by way of the Yakima or Columbia River Valleys or north through the lower valley of the Palouse River and the Great Plain of the Columbia to Spokane House, mostly by-passing the Hanford Reach (Symons 1882).

Though the goal of the United States explorations, such as the expeditions of C. Wilkes and J.C. Fremont, was to support American western expansion, early settlement in the Pacific Northwest was centered along the coast in the first half of the nineteenth century with few settlers residing in the interior. The early settlement in the Inland Northwest began with the arrival of various religious missionaries in surrounding areas in the late 1830's.

Marcus Whitman established the mission of Waiilatpu near the present site of Walla Walla; Henry Spaulding, one of Lapwai in Idaho; and Elkanah Walker, one at Spokane (Burns 1966). Furthermore, by this time the fur trade had started to decline and measles epidemics among Indians all over the Northwest began to cause unrest. In September 1847, Father Pascal Ricard, O.M.I. and four Oblates of Mary arrived at Old Fort Walla Walla to establish a mission on the Yakima River (Kowrach 1978:67-69). It is said that the original mission was located on the Yakima River flood plain south of Richland but was abandoned due to lack of available wood. In early January of 1848, the Oblate Brothers began construction of a site on the banks of Mnassatas Creek (Parker 1979:11). On November 29, 1847, a band of Cayuse Indians murdered the Whitmans and others at the Waiilatpu Mission west of the present city of Walla Walla. This event caused the evacuation of the area by the other missionaries in the Columbia River Basin, except the five Oblates who, at the request of the Yakima leader Kamiakin, established a mission on the Athanum River in the summer of 1848 (Splawn 1917:357,393). The massacre and subsequent evacuation discouraged any more settlement in the project vicinity for some time (Burns 1966). In fact, military orders forbade settlement until 1859 (Parker 1979:12).

The massacre of the Whitmans in 1847 had an immediate effect on the white population of the area (Ruby and Brown 1972). Defenses were prepared at Old Fort Walla Walla (Fort Nez Percés), and Peter Ogden with 16 men from the Hudson's Bay Company were dispatched to stop the killings in the area (Josephy 1965).

The Hudson's Bay Company was still the major Euroamerican power in the Columbia Basin, but the boundary settlement of 1846 between the United States and Great Britain established the international boundary at the 49th parallel. This caused some disruption in the Hudson's Bay trade and supply routes from the Fraser River to Fort Colville, due to the customs duties charged by the new Oregon Territory established in 1848. This, coupled with the declining fur trade, contributed to the end of Hudson's Bay Company activities in the Columbia Basin. Old Fort Walla Walla (Fort Nez Percés) was abandoned in 1855 (Chance 1973).

In the 1850's a few settlers began to arrive in the Pacific Northwest, but not in the study area with the exception of the Longmire party in 1853. Most of them came by ship and stayed on the coast while only a few ventured overland. Most of these stayed near the forts, leaving the Hanford Reach nearly devoid of Euroamerican inhabitants.

The Pacific Railroad surveys were conducted in 1853-54 by the U.S. Army (Gibbs 1855). In 1853 emigrants traveled through Walla Walla over Naches Pass on their way to Puget Sound (Josephy 1965:312). The 173 (155 according to Parker 1979:12) member Longmire party, with the help of the Hudson's Bay Company, built a scow and crossed the Columbia at Wallula on their way to Puget Sound (Parker 1979:12, 394-5; Ruby and Brown 1974:12). Cattle and horse ranchers began to utilize the area by 1860. Ben Snipes drove the first large herd of cattle to the Fraser Valley, crossing the Columbia just below Priest Rapids in 1856 (Sheller 1966), and Jordan Williams brought cattle to the White Bluffs area in 1861 (Parker 1979:13). A.J. Splawn, another early settler, noted:

It was a noted range with its sand grass and sage. We could gather fat cattle in winter and spring when they were poor in every other place. I bought and drove thousands of cattle from the White Bluffs range to Portland and Puget Sound (Splawn 1917:358).

By no means was ranching the only form of livelihood practiced in the area, but by far it was the mode. Settlement was sparse well into the 1860's (Splawn 1917:259, 272-273).

The other major cause of development in the Columbia Basin was the discovery of gold in Idaho in 1859 and to the north in the Colville District and in the Caribou District of British Columbia in the 1860's. A major network of trails and wagon roads developed in response to the discovery of gold (Fig. 4).

Ferries and permanent encampments were established in the 1860's with the growing necessity for crossing the Columbia River by travelers, miners, and freighters. The storehouses of an abandoned military depot at White Bluffs (Symons 1882) were occupied soon after their abandonment by one Thomas Howe who established a ferry across the Columbia at that location in 1861 (Rice 1976:4; Parker 1979:13). By 1863 Howe was gone, but A.R. Booth came to White Bluffs and operated a trading post, way station, and ferry. Things looked good for the early settlement at White Bluffs; the Caribou Trail intersecting White Bluffs was the end point of river travel for many miners and the beginning of their overland travel to the gold fields. In 1859 the steamship "Colonel Wright" took a load of miners and their supplies to Priest Rapids on their way to Similkameen in the northern Okanogan. *The Portland Oregonian* reported on March 1, 1866:

A second Sacramento; we are informed that a company has been formed at the Dalles who intend putting 25 heavy freight teams on the portage from White Bluffs to Pend Oreille at once and increase the number as required. These teams will start from White Bluffs by March 10. Thus we see another very important link in the communications with Montana supplies. We have ever looked upon White Bluffs as a starting point in this great trade, and we have no doubt that, relying on the merits of the route above, will continue to prosper, and it may become in time the Sacramento of the Columbia Valley.

Already a hotel and several stores have been established there. The pioneers of the town, Booth and Nevison, have already purchased a very extensive stock of goods. The town is to be properly surveyed, now that permanency is no longer a matter of doubt.

Between 1858 and 1868 the Caribou Trail which intersected the study area at White Bluffs took many miners from Wallula north into Canada through the Okanogan Valley (Fig. 4). An account from this period is cited by Victor (1870:577) and describes not only the area, but the Chinese miners who at the time inhabited it.

From Wallula to White Bluffs, the river is smooth and deep, offering no obstructions whatever to navigation. From this last named point the river cannot be navigated further until we reach Colville. Between these two places it makes a long detour, so that, following its course, the distance from one point to the other point is about 350 miles. The stream is so broken by rapids the whole way that boats cannot run upon it. The bars along the river have long been worked yielding small pay; but they are now almost abandoned by the whites, who are looking for richer mines, and in their stead are come great numbers of Chines ; some from Oregon, but the greater number from

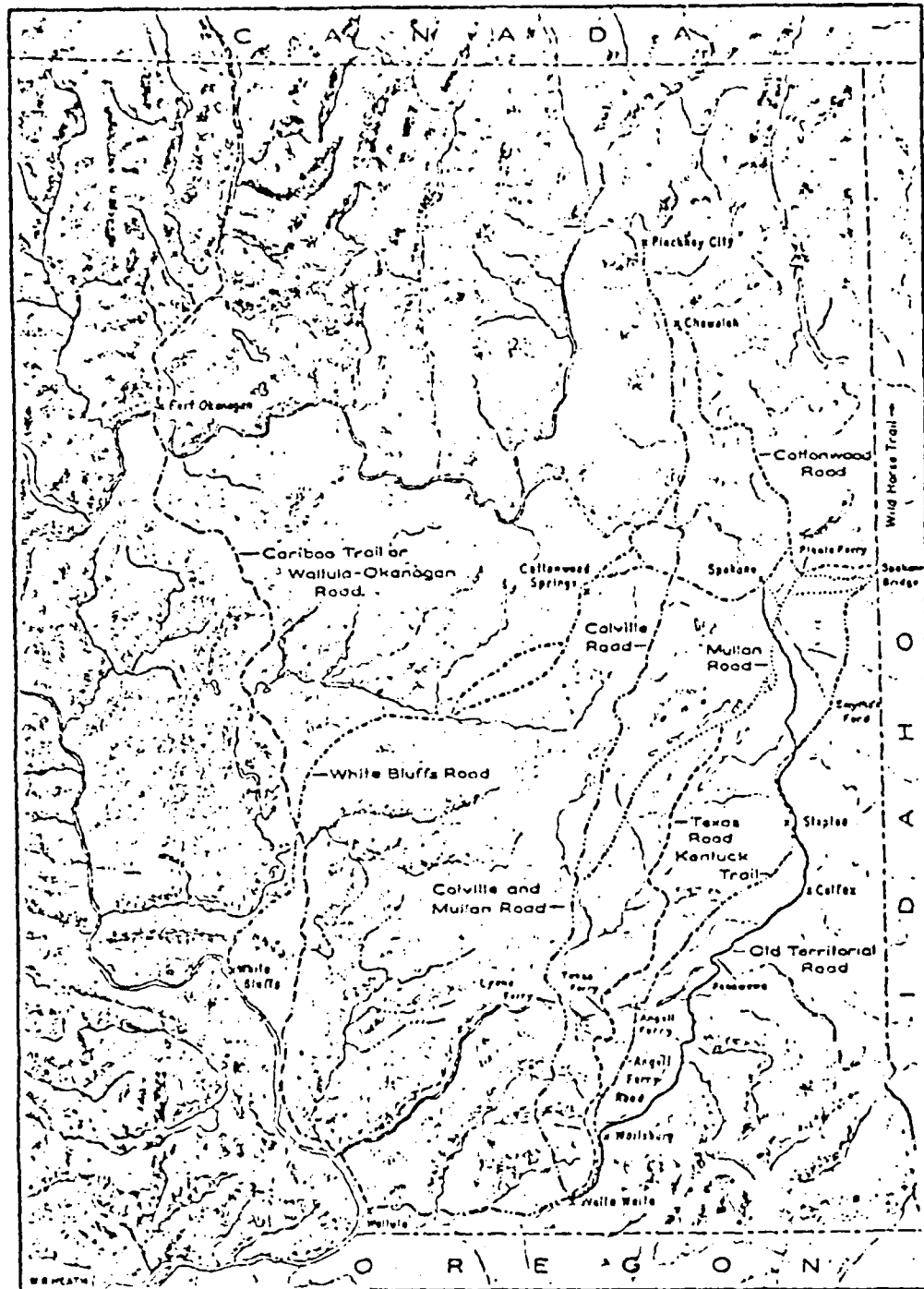


Fig. 4. Freeman's (1954) map of early roads in Eastern Washington including White Bluffs Road.

British Columbia. It is believed that there are now above one thousand of these persons working on the river between Priest's Rapids and Colville. They are said to be making from two to five or six dollars per day (Victor 1870:577).

In the 1860's wagon roads were established between White Bluffs and Fort Colville in order to supply the gold mines. Steamships traversed the Columbia from Portland to White Bluffs carrying supplies for the mines. Pack trains carried these goods from White Bluffs to the mines in Idaho and Montana, including an attempt to use camels between 1865 and 1867 (Lewis 1928). The Mullan Road from Fort Walla Walla (near Walla Walla city) to Fort Benton, Montana was constructed between 1859-63. This route bypassed the rapids of the Columbia and the miles of loose sand between White Bluffs and Pend Oreille (Harris 1972:11; Mullan 1863). White Bluffs lost out to Walla Walla City as the main supply route to the gold mines.

The Indian population was by no means taking all this activity in their area lightly. They had been decimated by epidemics carried in by Indians who had been in contact with sailors before Lewis and Clark arrived. Measles took their toll in the 1840's and resulted in the Whitman murders. Massive incursions by settlers and travelers through the area caused much tension and eventually war. In 1855 a treaty was signed by Governor Isaac Stevens of the Washington Territory and major Indian groups of the southern Plateau. Skirmishes with the Indians broke out sporadically between the late 1840's and 1858; at first with the Cayuse (1847) and then with the Yakimas (1855), Palus and Spokane (1858) (Splawn 1917). This treaty was a short lived attempt to bring some peace to the area. Chief Moses of the Columbias opposed the treaty and did not sign, but neither did he press a war upon the Euroamericans. Col. Wright, U.S. Army, led expeditionary forces against these tribes from Fort Walla Walla and Fort Dalles and subdued them, making the area safe for White settlers (Burns 1966).

The only Indian-White incident along the Hanford Reach was the murder of Blanche and Lorenzo Perkins at Rattlesnake Springs by Indian renegades fleeing from the Umatilla-Paiute wars in July of 1878 (Rudy and Brown 1963). The Perkins were White Bluffs horseranchers who were on their way to Yakima where Mrs. Perkins was to deliver her child. Upon hearing of the murders, the people of Yakima were sure that Chief Moses had been responsible and that he was preparing for war with the settlers. Chief Moses and General Howard, after exchanging several messages, met at Priest Rapids. At that meeting Howard got assurances that Moses' people had not murdered the Perkins' and that if the criminals could be found they would be turned over to the authorities. Chief Moses was assured that Howard would present a treaty to the government for consideration giving Moses' people an area which approximates the boundaries of the Hanford Reservation. Howard apprehended the Indians responsible for the murders, but Moses did not get his land, and many of his people later went to the Colville Reservation, something Moses was opposed to (Splawn 1917).

Another leader of the Indians who made his home along the Hanford Reach was Smohalla. Smohalla was a prophet of the Dreamer religion and influenced the Indians of this area greatly all through the last half of the 1800's (Mooney 1896). He was a man of peace and urged his people to shun the white man's ways and return to the old ways. His religious following became a refuge for those Indians escaping the wars and the reservations. For this reason the Indian agent at Yakima complained. At the request of the Bureau

of Indian Affairs, Major MacMurray was sent in 1884 to get Smohalla to go to a reservation but he would not go; the remnants of the people who followed him still reside near Priest Rapids (Relander 1956). Smohalla and Moses, though both important Indian political leaders of the time, never did get along and were on opposite sides of the political spectrum, except that neither one wanted his people to leave the area.

By 1870 ferry service diminished. The population of the area was scattered for the most part, though there were enough people for the founding of Yakima County in 1865. These people were mostly cattle and horse ranchers (including Kuntz, Perkins, and Splawn). Letting their stock roam free all year except for a spring and fall roundup, no provision for extra feed was made, and overgrazing, though only beginning to show at this time, would soon extensively enlarge the areas of loose sand already common in the area (Coonc 1917; Parker 1979).

The winter of 1880-1 was particularly bad. Cattle were unable to find the dried bunch grass under up to four feet of snow. Thaws in the late winter caused a crust of ice to form over the snow, which cut the animals' legs as they tried to move through the snow. Nearly 80 percent of the cattle and from 10-20 percent of the horses were lost from exposure and starvation. When spring came the stench of decaying cattle was unbelievable (Splawn 1917:322-324). Most stockmen recovered their losses, but as more settlers arrived range land became limited. The winter of 1886-7 suffered the same upon the ranchers (Parker 1979).

The need for some type of irrigation system became clear if the needed winter feed was to be grown. Each farm had its own system, and it was soon discovered that with water the soil could produce much more than hay. The influx of settlers after the turn of the century and the demand for more and better water systems caused the development of schemes to do just that (Parker 1979).

In 1892 the Yakima Irrigation and Improvement Company (Y.I. & I.) was formed, and proposed to build a system of canals and irrigation ditches from the Yakima River north to the Priest Rapids and east to the Columbia River (Parker 1979). The company went into receivership, however, in the late 1890's, but did succeed in beginning some canal building in the area, and set the stage for future irrigation developments.

A summary of what the Y.I. & I. accomplished may be of some use:

The first Y.I. & I. and Ledbetter ditches were planned to irrigate the east slope of Rattlesnake and were evidently partly built, for both Mrs. Harris (1972) and Van Arsdol (1958) said that traces of them can still be seen. The Hanford Atomic Reserve made later implementation impossible.

The second Y.I. & I. ditch, headed at the Horn of the Yakima, is still in use on the south and west bank of the river, and belongs to the Columbia Irrigation District.

The third ditch, which Nelson Rich had the contract to build from the Horn to the Columbia, was evidently on the north and east side of the Yakima, and may have been the one referred to as the 'old home ditch'

in the 1904 *Columbia Courier*. . . This ditch is only in use at the extreme west end. At one time it went through the new city of Richland after the government takeover in 1943. This section was filled in and grassed over, and houses were built over its former course. But part of it can be seen from Highway 240 on the Vantage cut-off, about a mile from town.

The fourth ditch important to the early town of Richland was one under Nelson Rich's private ownership. It headed at the Yakima several miles below the Horn. . . All but the faintest traces of this ditch are gone (Parker 1979:19).

White Bluffs revived operation of a ferry in the later part of the 1800's and by 1900 ran a horse-powered paddle wheel ferry (Ruby and Brown 1974). A cable ferry was established at Richland in 1894 and by 1903 was carrying a large number of people and supplies up the river. Steamship service up and down the Columbia, though unscheduled, was constant shortly after 1900. Irrigation projects, though still private for the most part, were bringing more and more acreage under irrigation. The *Columbia Courier* began publication in Kennewich in 1903. Roads, though established, were little more than trails, and the towns of the area were growing. The real estate evaluation in the county had gone from 4,965,169 in 1902 to 5,104,470 in 1903 (Parker 1979). Farmers in the area had discovered how well fruit and produce requiring a long growing season did in the area, and began to grow them in prodigious quantities. Hanford and White Bluffs became settlements and both acquired post offices in 1908. Richland received its post office in 1905. The area warranted a whistle stop on the Northern Pacific Railroad by President Theodore Roosevelt at Pasco on May 29, 1903. In October of the same year, a dam was built at the head of the canal at Horn Rapids on the Yakima River to insure a constant supply of water. Basically, the area was taking the shape of many farming areas in the west. People were moving in, farmers were bringing forth better crops, and opportunities for the improvement of the area existed and were taken advantage of (Parker 1979).

The Hanford Irrigation and Power Company was formed early in 1906 and water was flowing through the system by 1908. Though its service was sporadic, it and its successors provided the area with water until 1943 when the Hanford Works was established.

The history of the Hanford Reach from 1900 to 1943 is a study of fruit farming, and to a lesser extent, the development of transportation. Farmers did well and produce from the Hanford Reach took prizes at regional fairs throughout the Columbia Basin. An economical slowdown following the First World War stunted the area's growth, and the slow recovery of the area was pulled down by the major depression of the early 1930's. The cost of water was a major obstacle to the continued development of many farms in the 1920's and 1930's. For this reason, many farmers dug their own wells. This resulted in the discovery of natural gas in the Rattlesnake Hills area in 1912. In spite of many problems encountered in the early oil and gas fields, a reasonable quantity of gas was produced, until the wells ran dry in 1941 (Parker 1979).

Automobiles became more and more frequent. By the late 1920's the steamers going up and down the Columbia were gone, and the horse powered ferries of the early 1900's gave way to larger gas or diesel powered ferries

which would carry cars. Wooden bridges were built on the Yakima River south of Richland, but were often taken out by icejams during the winter. Bridges were lost in 1905, 1906, 1907, 1910, 1917, and 1920 (Parker 1979).

The towns of Hanford and White Bluffs grew significantly in the early part of the twentieth century. The following census figures are reported by Parker (1979):

<i>Census figures:</i>	1910	1920	1930	1940
Hanford	369	429	429	463
White Bluffs	323	387	672	501
Richland	721	1042	764	576
Whole County	7937	----	----	----

Hanford's population leveled off, while White Bluffs' continued to grow, and between 1920 and 1940 Richland's population declined.

By the end of the 1930's, the status of the three major towns in the area had stabilized. Hanford, White Bluffs, and Richland would continue as small farming communities, dependent on larger cities like Yakima, Spokane, or Walla Walla. The smaller hamlets of Cold Creek, Vernita, Mitchell, Wautomia, Haven, Allard, Riverland (Cresswell), Wahluke, and Julia would remain dependent on the towns of Hanford and White Bluffs for specialized services such as medical needs beyond the General Practitioners of the area. The Second World War started in 1941 and, like other small towns, the towns of the Hanford Reach sent their sons to war.

The residents were given notice early in 1943 that the Hanford Engineering Works was being established by Manhattan District, U.S. Army Corps of Engineers, and that all people would have to move out of a large area including the towns of White Bluffs, Hanford, and Richland. Many farms would have to be abandoned, while others could be farmed but the land would be bought by the government. Residents of Hanford, White Bluffs, and Richland were given 30 days to leave (Parker 1979).

The Hanford Engineering Works was the site of drastic change between 1943-45. Total earth moving at Hanford amounted to 25 million cubic yds; 780,000 cubic yds of concrete were laid; 40,000 tons of structural steel (excluding railroad and stainless steel), 160,000,000 board feet of lumber, and 8,500 pieces of major construction equipment were used on the job (Van Arsdol 1958).

The site of the former Hanford townsite contained 131 men's barracks (total capacity 24,319), 4 women's barracks (total capacity 4,480), 320 double hutments and 340 single hutments, making the total housing capabilities of the camp 39,050. A trailer camp was established at Hanford which at its peak held more than 17,000. The total available housing of Hanford at its peak was for about 54,000 (Van Arsdol 1958). After the war and all the construction that went with it, workers left the area, and in the spring of 1946 bids were let for the dismantling of the Hanford townsite (City of Richland 1968).

CULTURAL RESOURCES OF THE HANFORD REACH

For the Hanford Reach study an exhaustive inventory of available data regarding areal cultural resources was prepared (Rice and Chavez 1980). This inventory provides the most basic descriptive information known about the sites. Several kinds of archaeological sites are represented. These include open campsites, house pit village sites, cemetery sites, fishing stations, flaking floors, stone features, and rockshelters. Some sites have been recorded by others on the basis of isolated finds of single specimens, but these sites are few in number. In general, the known prehistoric cultural resources are closely associated with the Columbia River. Very few archaeological sites have been found more than 300 ft away from the river even though several surveys have included that area. Few historic sites have been recorded in the Hanford Reach and more effort needs to be expended in order to assess possible sites. The focus of historic sites is in the vicinity of the Hanford and White Bluffs townsites and at old ferry crossings. Few buildings remain today and among these the ones that would require evaluation include the school houses at Hanford and White Bluffs and the Allard power plant.

Among the prehistoric cultural resources identified, subsurface excavations have been conducted at only eight (Krieger 1928a; Rice 1969, 1973, 1978; Paglieri and Rice 1976), including 45-GR-302A, 45-GR-306B, 45-GR-316, 45-BN-149, 45-BN-157, 45-BN-179, 45-BN-180, and 45-BN-257. Two important cultural sequences have been established for the reach based upon the work conducted at 45-BN-157 and 45-BN-179. Both sites contained stratified evidence of prehistoric occupation (D.G. Rice n.d.). The analysis of recovered materials, which is presently being undertaken by the senior author, indicates a chronology ranging from 5000 to 7000 years ago. Cultural assemblages have been recovered from both sites that are assigned to the Vantage, Frenchman Springs and Cayuse phases of the Middle Columbia Region (Fig. 5). These sites are the basis for chronology and culture sequence within the study area.

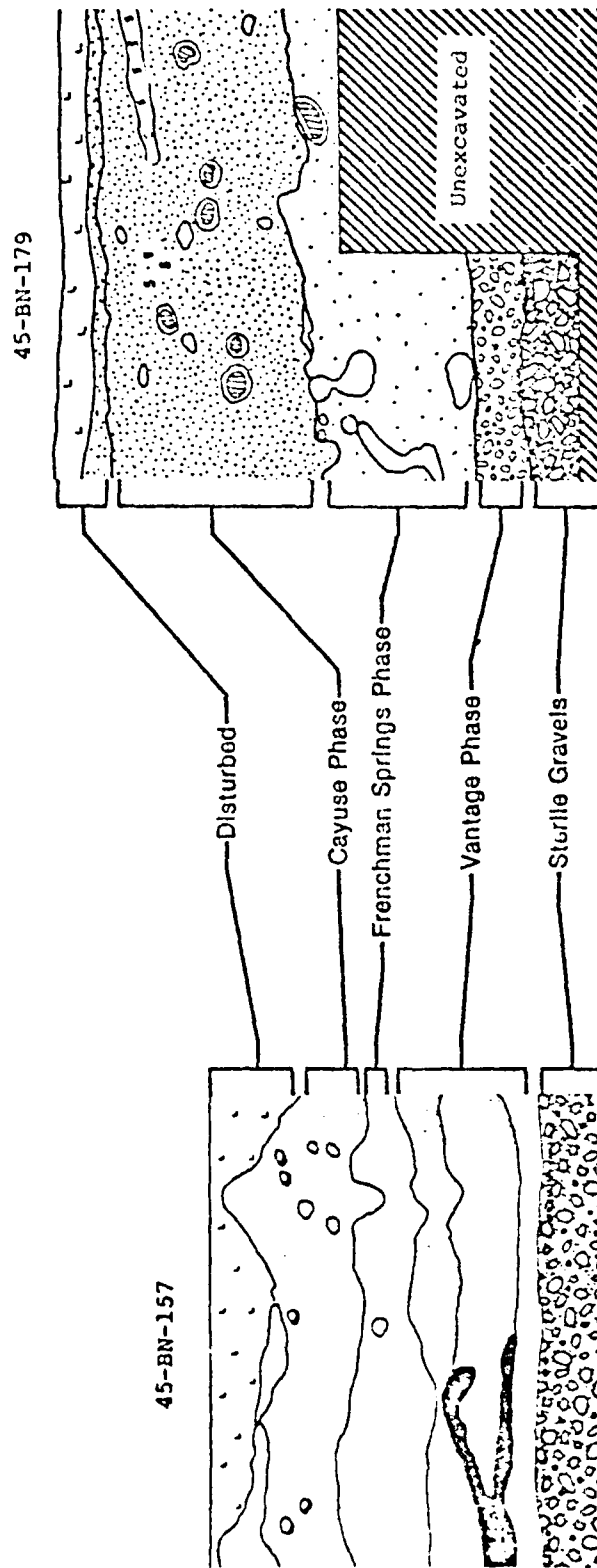


Fig. 5. Correlation of cultural and natural units at 45-BN-157 and 45-BN-179.
Scale: 1 in = approximately 1.5 m).

NATIONAL REGISTER SITES

In response to Presidential Executive Order 11593 (1971), Richland Operations, U.S. Atomic Energy Commission began the nomination of archaeological sites recorded on the Hanford Works (Rice 1968a, 1968b) to the National Register of Historic Places. The importance of the National Register is that sites determined eligible must be evaluated by the Advisory Council on Historic Preservation and the State Historic Preservation Officer prior to land modification activities affecting such sites. This procedure is called a Section 106 Review and was established by the National Historic Preservation Act. In effect, the Section 106 Review authorizes the expenditure of federal funds for mitigation of adverse effects to eligible sites, if necessary.

In all, seven National Register sites (2) and districts (5) are listed within the project area for the Ben Franklin Dam alternative (*Federal Register*, Vol 43, No 26, Part II). These cultural resources included the Wooded Island archaeological district, Savage Island archaeological district, Hanford Island site, Hanford North archaeological district, Locke Island archaeological district, Ryegrass archaeological district, and Paris site (Figs. 6-13). The specific archaeological sites contained within each National Register district are listed in Table 2; their known characteristics are described in two archaeological reconnaissance reports (Rice 1968a, 1968b). The nomination of the Wahluke District is pending. In addition to these sites and districts, 45-BN-157, 45-BN-179, 45-FR-265 and 266, and a complex of sites at Coyote Rapids (45-BN-152, 45-GR-312-314) are prehistoric cultural resources that are eligible for listing on the National Register based upon their potential to contribute to the knowledge of regional prehistory.

In most cases the archaeological district nominations were patterned after clusters of sites called "site complexes" (Rice 1968a; Nelson 1973). A functional relationship between prehistoric sites within a site complex is hypothesized. These relationships are putative and need to be tested and further defined. Basically, the differences in site function need to be defined and their hypothesized connection with the emergence of the winter village pattern established.

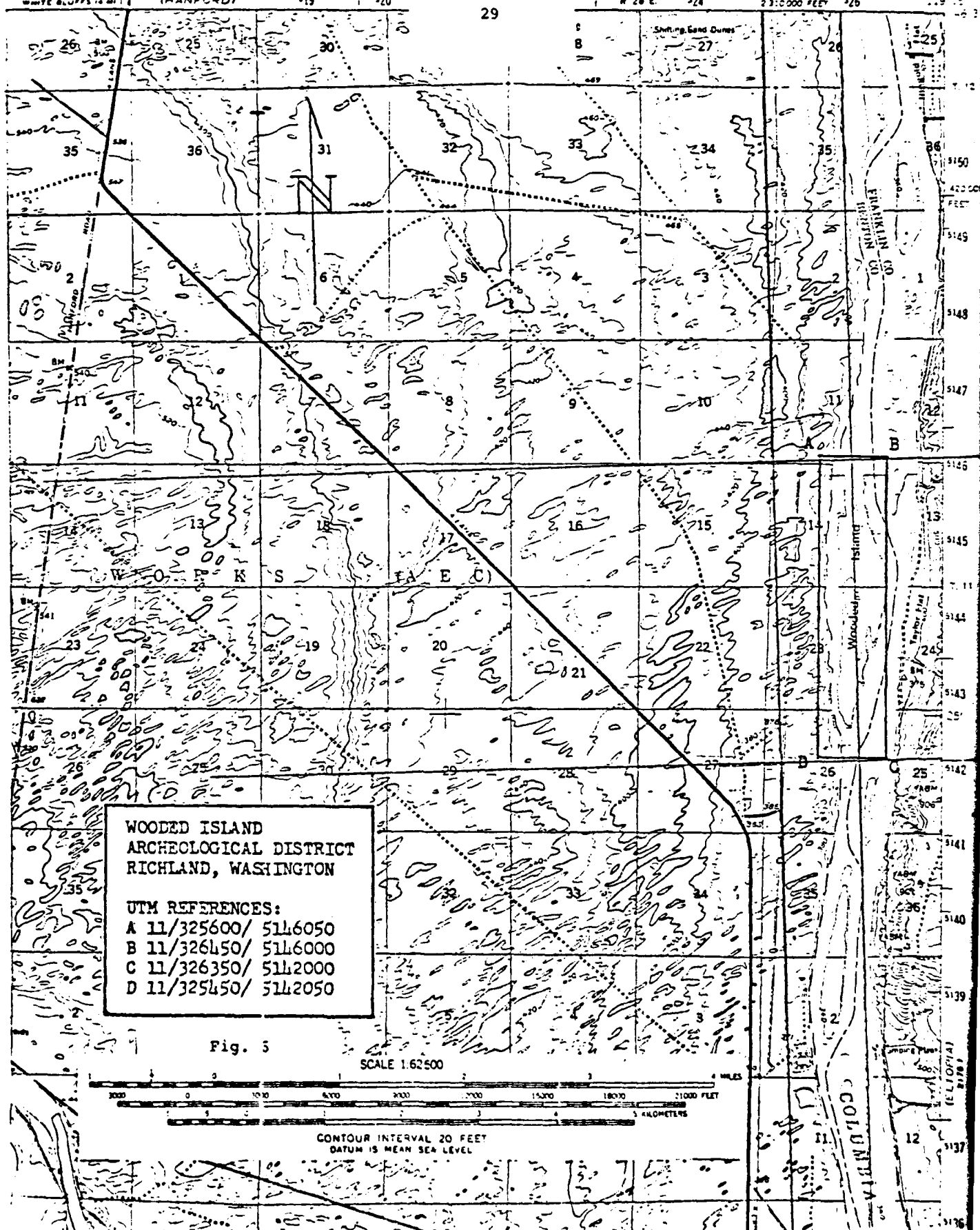
No historical sites are presently listed on the National Register within or adjacent to the study area. The known historical sites that may be eligible for listing include the Allard generating plant at Coyote Rapids, the Hanford irrigation ditch, Hanford townsite, White Bluffs townsite, Wahluke ferry, the log structure (a blacksmith shop) at East White Bluffs landing, mining operations on China Bar and opposite the upstream margin of China Bar, Richmond Ferry, and Arrowsmith. Of these historic places within the project area for the Ben Franklin Dam alternative only a few have any remaining trace. In the past 35 years most pre-Hanford Reservation structures have been removed or demolished by the military. The historic sites that still hold some promise for historical archaeological studies include the Hanford irrigation ditch and White Bluffs townsite.

TABLE 2. Sites listed on the National Register of Historic Places

1.	<i>Wooded Island District</i> 45-BN-107-112, 168	River Mile 349 to 351
2.	<i>Savage Island District</i> 45-BN-116-119 45-FR-257-262	River Mile 357 to 361
3.	<i>Hanford Island Site</i> 45-BN-121	River Mile 362.5
4.	<i>Hanford North District</i> 45-BN-124-134, 178	River Mile 365 to 368
5.	<i>Locke Island District</i> 45-BN-137-140, 176 45-CR-302a,b,c, 303-305	River Mile 371 to 373
6.	<i>Wahluke District (Pending)</i> 45-BN-141-147 45-GR-306a,b,c	River Mile 374 to 377
7.	<i>Rye Grass District</i> 45-BN-149-151	River Mile 380.5 to 381.5
8.	<i>Paris Site</i> 45-GR-317	River Mile 387

15 MINUTE SERIES (TOPOGRAPHIC)

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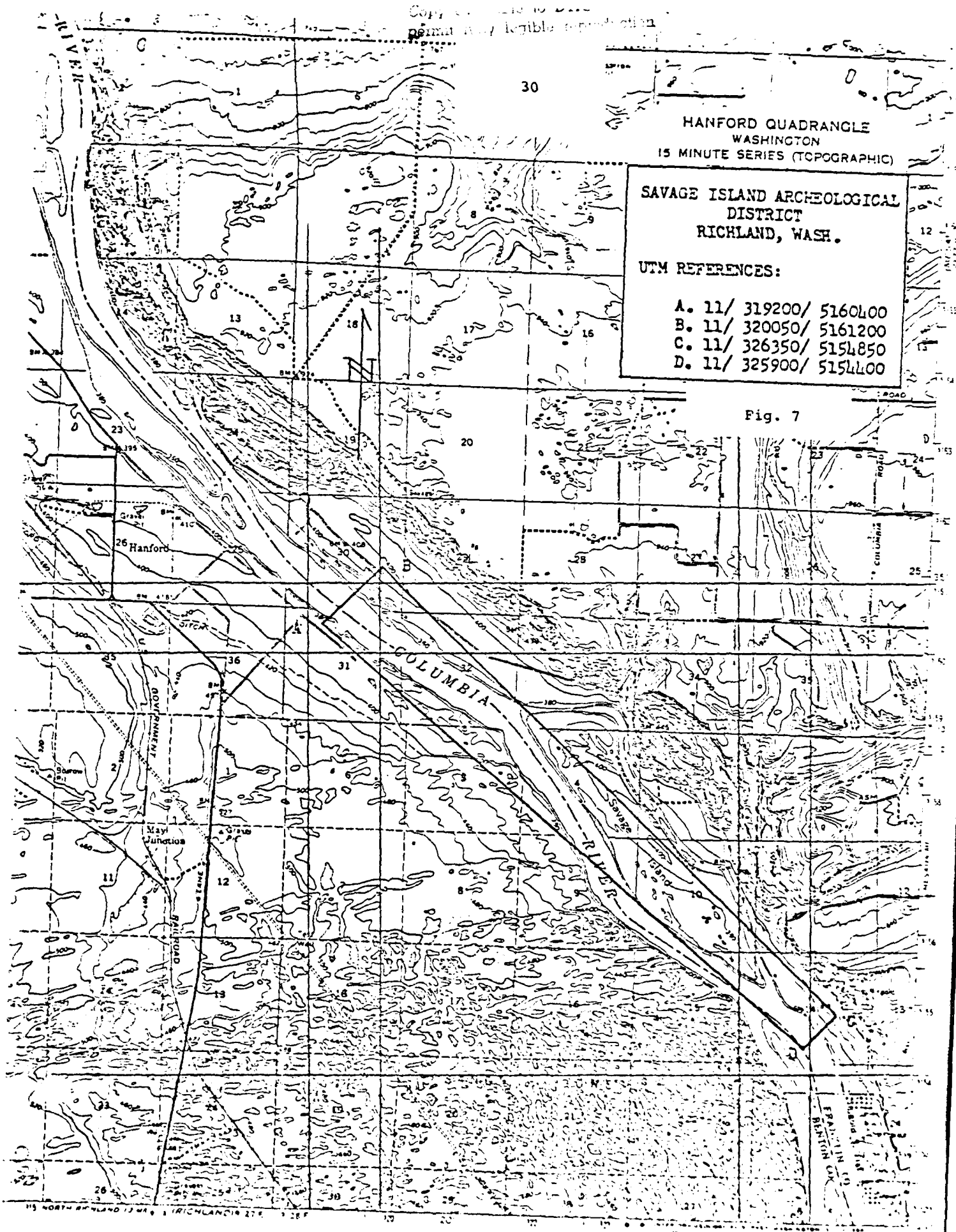
HANFORD QUADRANGLE
WASHINGTON
15 MINUTE SERIES (TOPOGRAPHIC)

SAVAGE ISLAND ARCHEOLOGICAL
DISTRICT
RICHLAND, WASH.

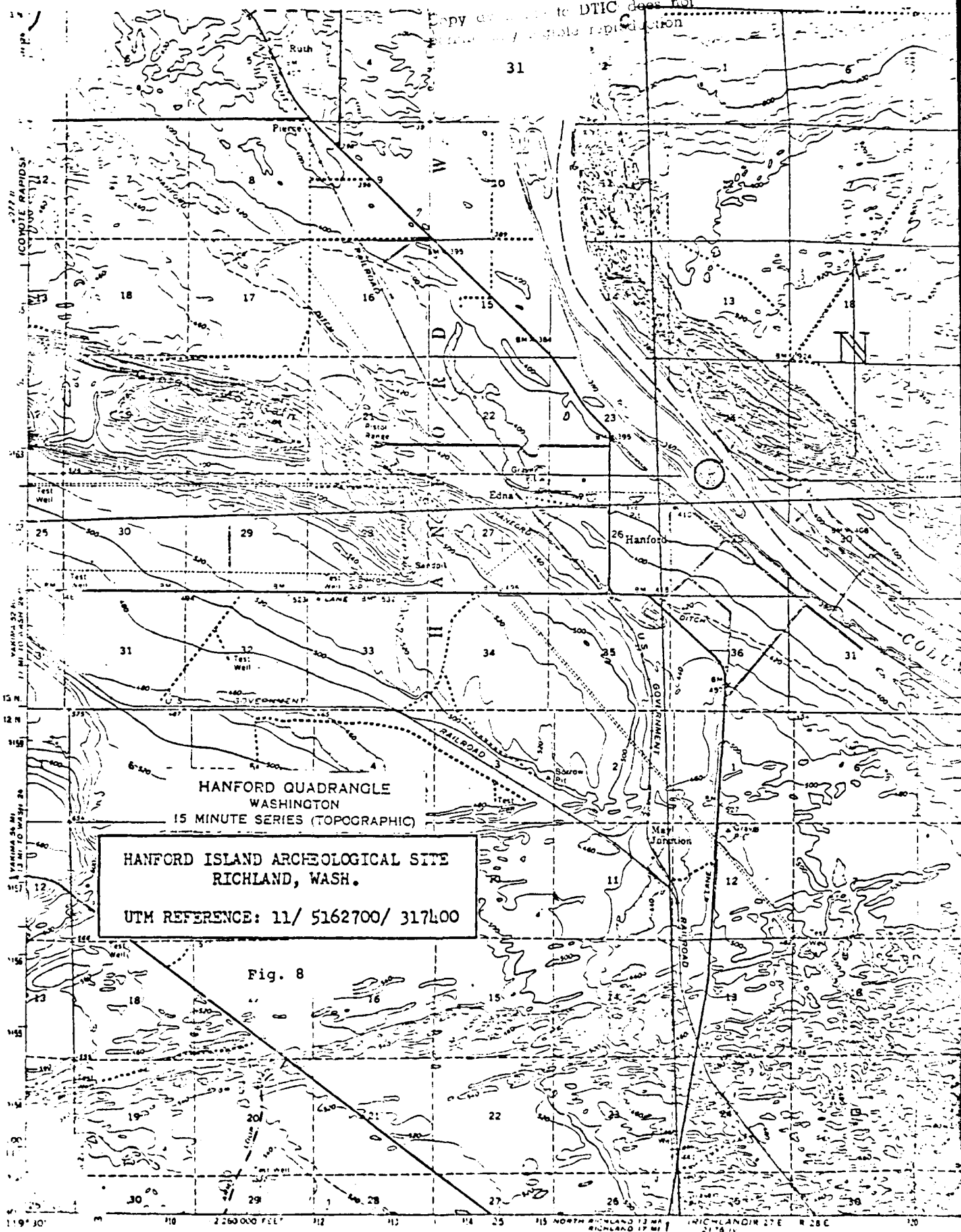
UTM REFERENCES:

- A. 11/ 319200/ 5160400
- B. 11/ 320050/ 5161200
- C. 11/ 326350/ 5154850
- D. 11/ 325900/ 5154400

Fig. 7



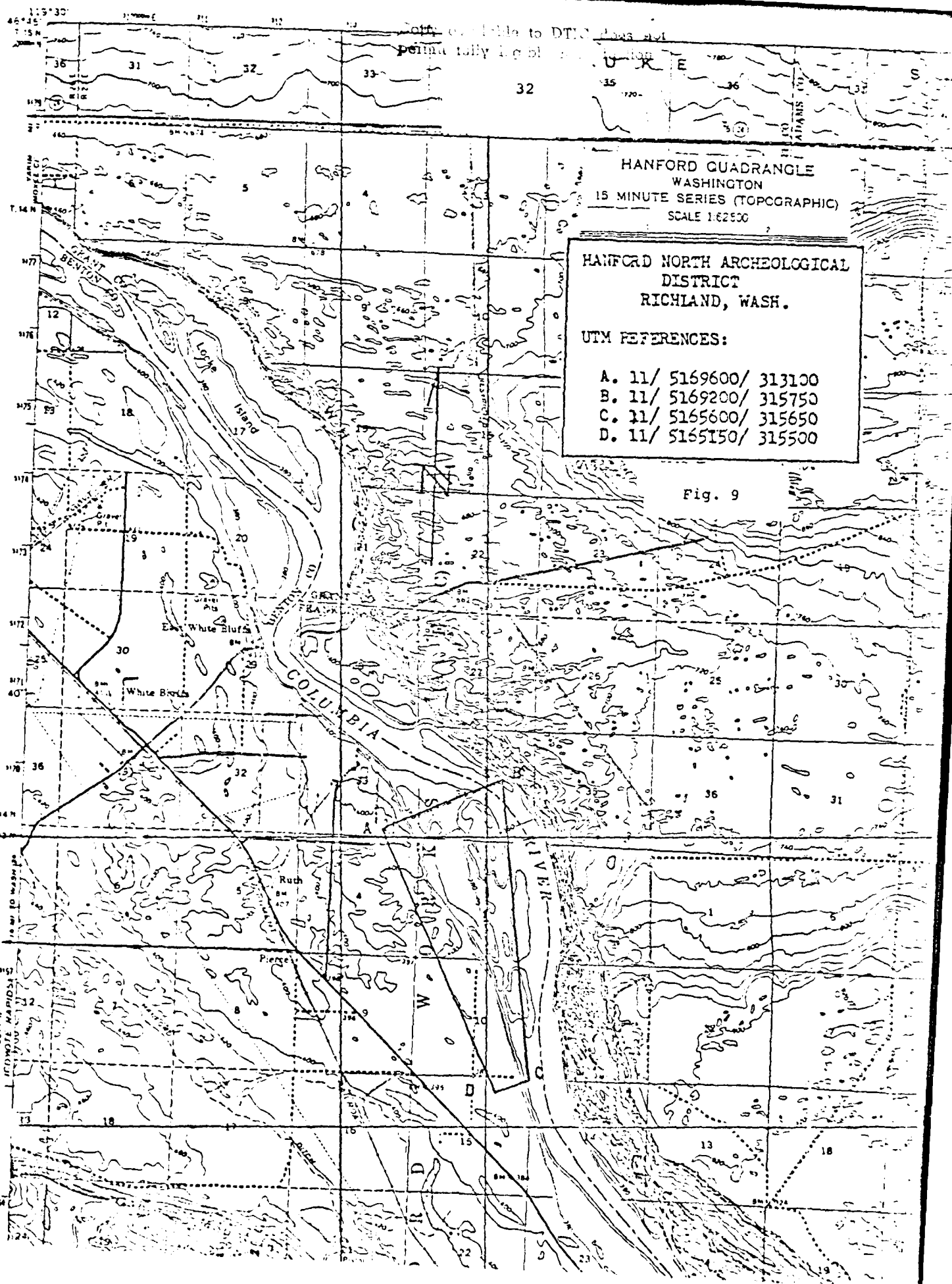
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HANFORD ISLAND ARCHEOLOGICAL SITE
RICHLAND, WASH.

UTM REFERENCE: 11/ 5162700/ 317400

Fig. 8



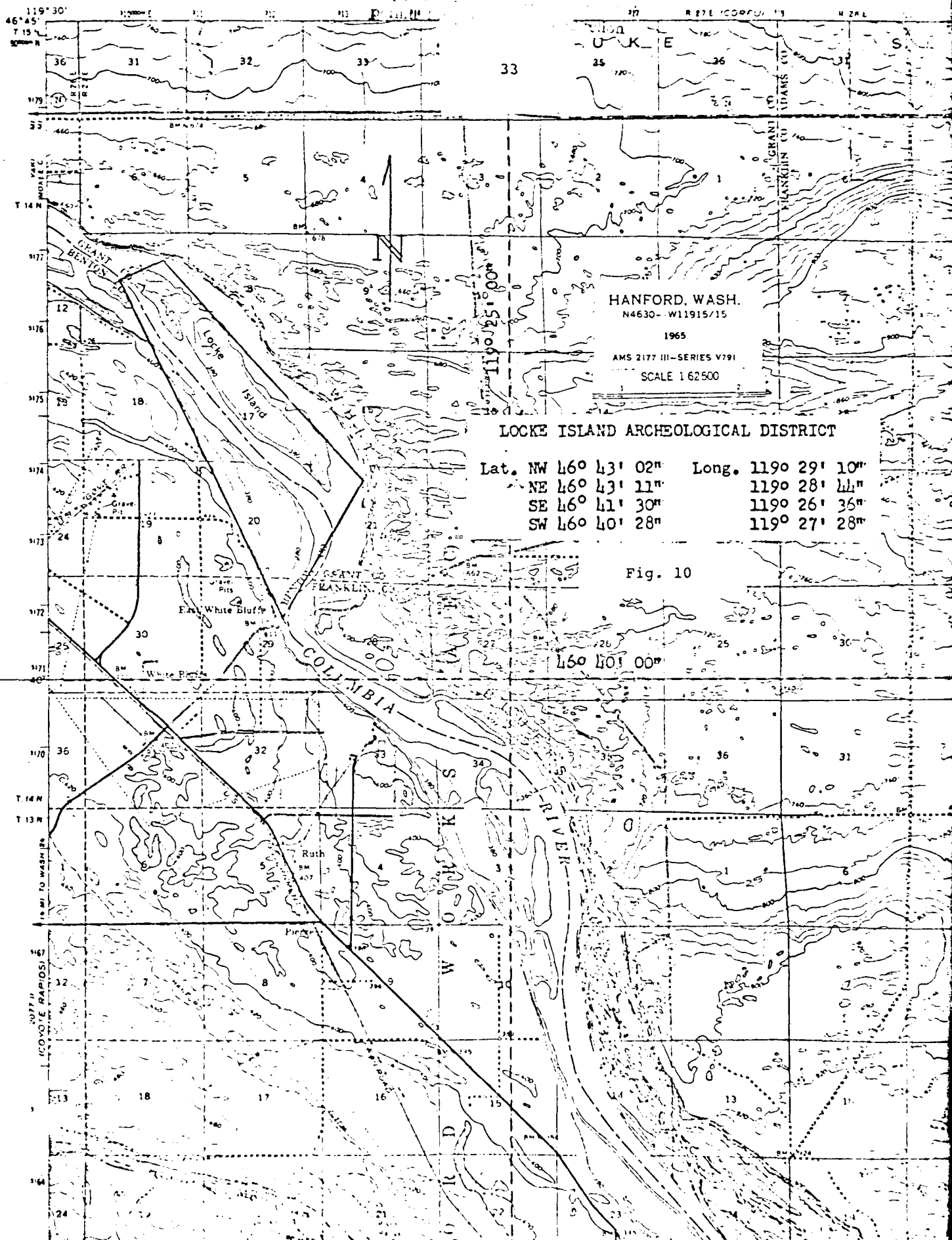
HANFORD QUADRANGLE
WASHINGTON
15 MINUTE SERIES (TOPOGRAPHIC)
SCALE 1:62500

HANFORD NORTH ARCHEOLOGICAL
DISTRICT
RICHLAND, WASH.

UTM REFERENCES:

- A. 11/ 5169600/ 313100
- B. 11/ 5169200/ 315750
- C. 11/ 5165600/ 315650
- D. 11/ 5165150/ 315500

Fig. 9



UTM REFERENCES:

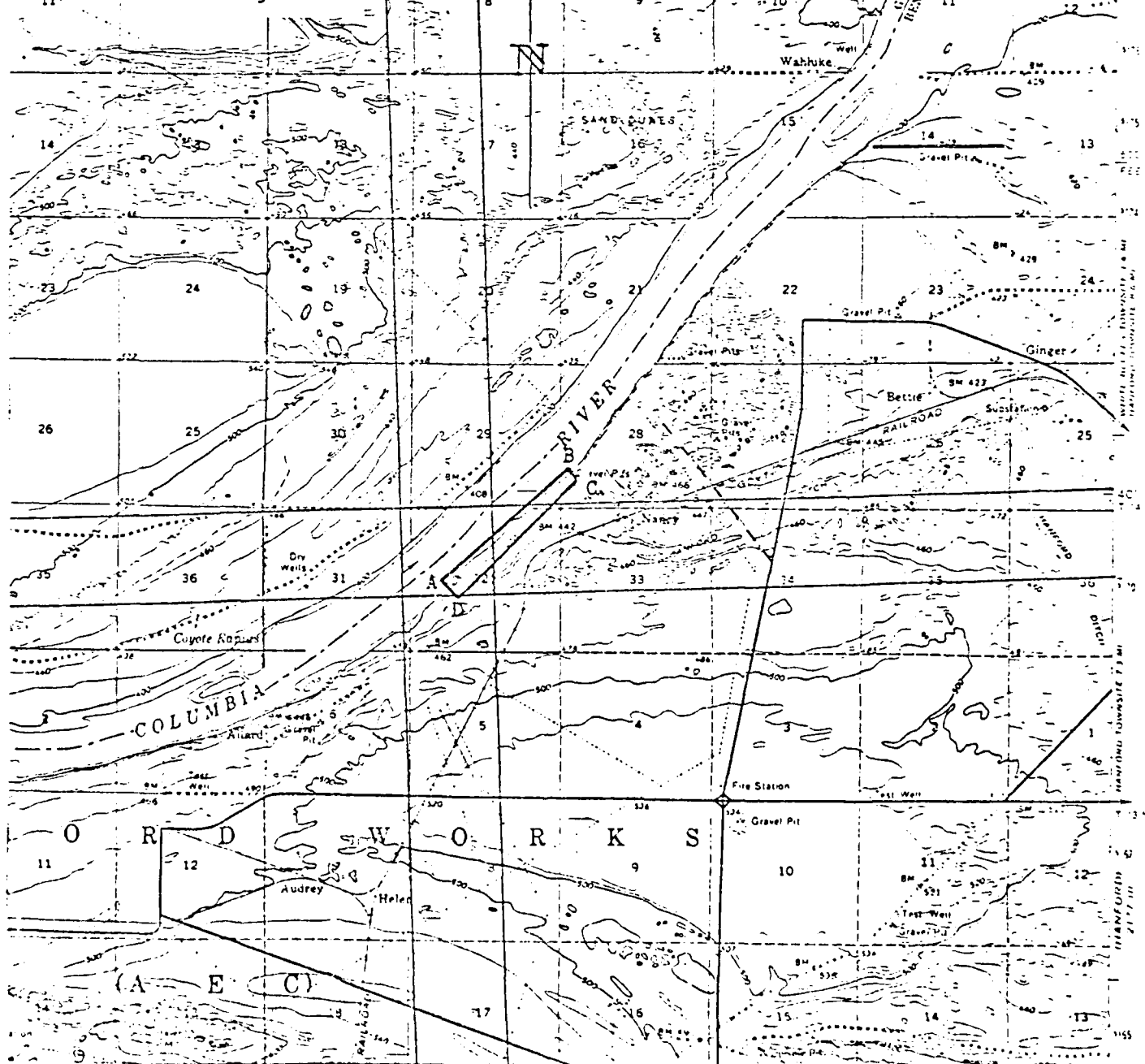
A 11/	306250/	5177500
B 11/	309300/	5177500
C 11/	309175/	5176100
D 11/	307450/	5176575
E 11/	306800/	5175550
F 11/	305900/	5175575

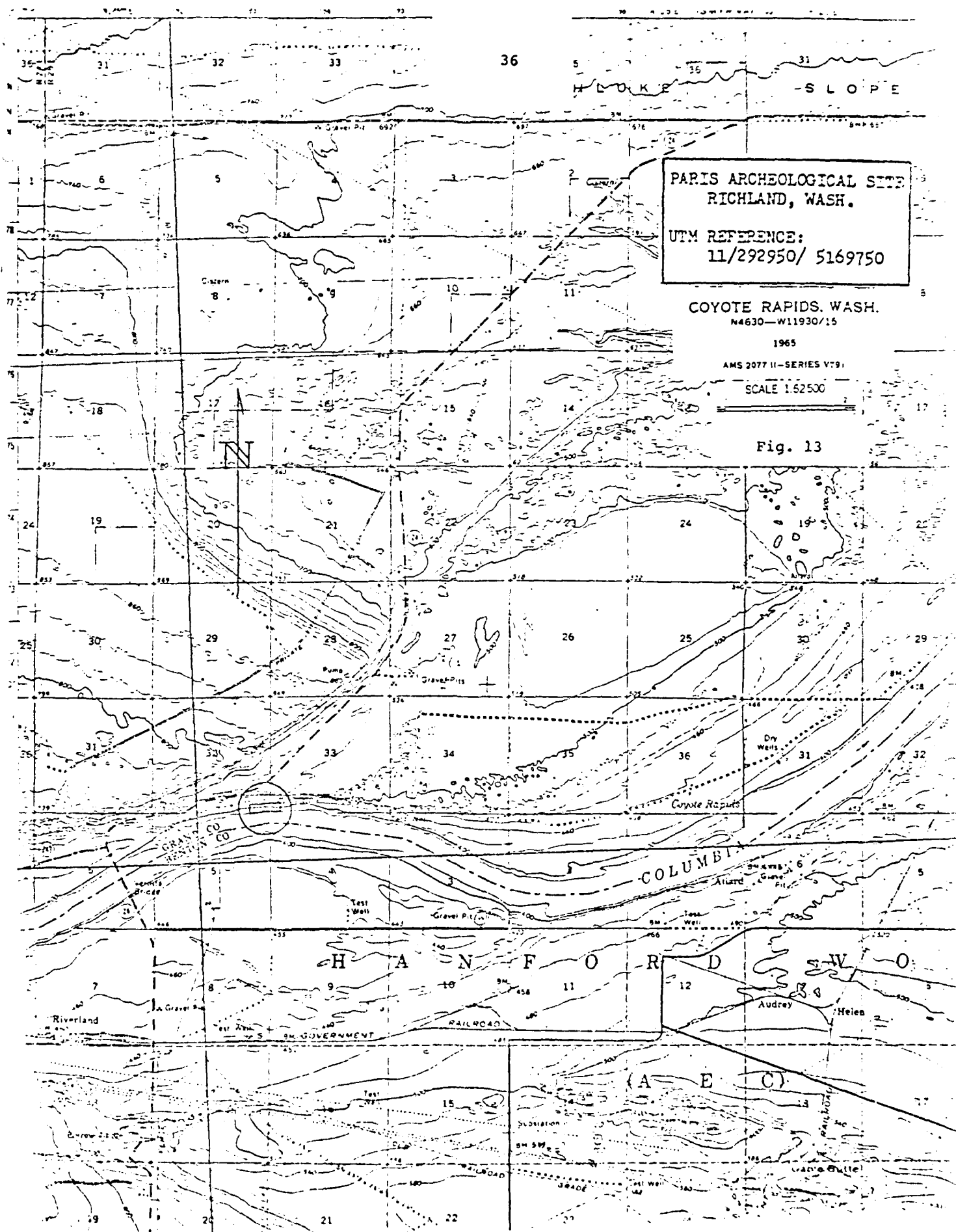
COYOTE RAPIDS QUADRANGLE
WASHINGTON
15 MINUTE SERIES (TOPOGRAPHIC)

15 MINUTE SERIES (TOPOGRAPHIC)
SCALE 1:62500

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Fig. 12





The major significance of the National Register sites and others eligible for listing on the National Register lies in the fact that they comprise the last intact sites and site complexes along the Columbia River and they are key cultural resources to the reconstruction and interpretation of Plateau prehistory. In addition to their scientific value, most of the prehistoric sites have been preserved from destruction or vandalism by virtue of their situation on the Hanford Reservation which has been closed to public access since 1943. The significance of these particular cultural resources is further magnified by the detailed technical studies conducted at Hanford regarding local geology, soils, aquatic and terrestrial ecology that can be related to the cultural resources. These facts present an unusual opportunity for multidisciplinary scientific research. The best way to maximize the significance of the National Register sites is to maintain their long-term research value through preservation rather than to implement total, one-time, short-term data recovery through site salvage operations.

The prehistoric cultural resources of the Hanford Reach are of major importance to Columbia Plateau prehistory. They are in one of the last remaining areas where site complexes are preserved intact and may be evaluated in terms of their functional relationships. Many of these cultural resources document the settlement pattern of the ethnohistoric Wanapam Indian people and, therefore, may provide important clues as to site functions. The cultural resources of the Hanford Reach are located in a zone of ecological tension in which minimal fluctuations in precipitation may bring about major changes in local environment; therefore, these sites may be critically important in determining the impacts of changing climate upon prehistoric peoples of the area and also a means of testing putative models of paleoclimates. The prehistoric sites of the Hanford Reach also contain cultural and environmental materials which are of great importance in interpreting the cultural history and process of the Columbia Plateau. In particular, these cultural resources comprise the missing links between the prehistory of the middle Columbia, the lower Columbia, and the lower Snake River regions.

Specific research inquiries might include the following:

- What is the chronology and culture sequence of the Hanford Reach and how does it compare with adjacent regions?
- What evidence is there of the environmental impacts of the Thermal Maximum (Hypsithermal) or of volcanic ashfalls upon the prehistoric inhabitants of the area?
- Many sites thought to be winter villages are located on islands. Are these sites actually winter villages and, if so, why are they located on islands?
- What was the economic base of the prehistoric inhabitants?
- There are no tributary streams that enter the Columbia River in the Hanford Reach. How did the lack of tributary streams affect the settlement pattern of prehistoric peoples and their seasonal round of life?
- Why are most prehistoric sites widely scattered, but rarely stratified?

- How do the identified cultural resources relate to the historic Wanapam people and their pattern of life? What are the heritage values of these resources to the contemporary Wanapam people?
- The Pasco Basin was frequently flooded in prehistoric times. What has been the impact of flooding upon the prehistoric lifeways of the area? How has flooding affected the preservation of cultural resources?

EVALUATION OF IMPACTS

The Ben Franklin Dam alternative defined by the U.S. Army Corps of Engineers (1969) would impact the Columbia River between River Mile 348-397. The dam itself would be a low head, earth filled dam over 7700 ft wide and with a height of 82 ft above existing streambed. The dam axis would be located at Wooded Island, about 10 mi upstream from Richland, Washington. A reservoir would be formed by the dam and have a normal full pool level of 400 ft MSL and a minimum pool level of 390 ft MSL. The reservoir would be about 49 miles in length, have a surface area of 25,000 acres, and have 120 mi of shoreline. The reservoir would create about 40 islands whereas 15 now exist. Channel dredging would only be needed to maintain commercial navigation through the reservoir if navigation were an authorized project purpose. These design features constitute the primary impact area. A secondary impact area is recognized along the margin of the reservoir area from 400-450 ft MSL and downstream from the damsite along the Columbia River to River Mile 339.

A total of 122 recorded cultural resource sites are located within the primary impact area (Table 3). These sites are situated at or below 400 ft MSL and would be inundated by the reservoir or destroyed by dam construction activities. Another 12 sites lie in a secondary impact area between 401-450 ft MSL and may be subject to erosion by fluctuating water levels, wave action, or disturbance by channel dredging (Table 3). A total of 32 sites lie in another secondary impact area downstream from the damsite (Table 3). Based upon experience with other reservoirs on the Columbia and Snake, these sites may be eroded by fluctuating water levels. These sites are identified by impact in Appendix C.

The significance of these impacts is that at least 122 archaeological sites would be adversely affected by the project. Among these sites are at least seven National Register sites and archaeological districts and many sites that may be eligible for listing on the National Register. A Section 106 review will be necessary in the event the Ben Franklin Dam alternative gains authorization as provided by the National Historic Preservation Act. The Section 106 review should reflect that in the best interest of the cultural resources they should be preserved for the long-term benefit of the public. Salvage excavation of the cultural resources should be considered as a less desirable alternative to the multidisciplinary opportunities afforded by long-term research. There appear to be no satisfactory means to avoid or reduce adverse impacts of construction and erosion to cultural resources as a result of implementation of the Ben Franklin Dam alternative. Since the Hanford Reach of the Columbia has been a biological study area for many years and is partially closed to public access it is not considered that implementation of the Ben Franklin Dam alternative would present the best opportunity to study the cultural resources of the Hanford Reach. In addition, the cost of mitigation for cultural resources would be great. Although preservation *in situ* is the preferred alternative, based on analysis to date, it is assumed that archaeological salvage would be necessary to mitigate the impacts of the Ben Franklin Dam on cultural resources of the Hanford Reach.

TABLE 3. Sites Listed by Impact Area and Elevation

Primary Impact Area \leq 400 ft MSL

45-BN-35 to 42	45-FR-251 to 266
45-BN-90	45-FR-286
45-BN-107 to 148	45-GR-301 to 318
45-BN-150	45-GR-320
45-BN-152 to 157a,b	45-GR-321
45-BN-160a	45-GR-323
45-BN-169	45-GR-324
45-BN-176	45-GR-326
45-BN-221 to 228	45-YK-58
45-BN-257	45-YK-151
45-FR-24 to 27	45-YK-153

Total = 122 sites in Primary Impact Area
 Total below or at 400 ft = 122
 % of Total = 74

Secondary Impact Area (below Damsite to River Mile 339) \leq 400 ft MSL

45-BN-26 to 34	45-BN-186
45-BN-43 to 45	45-BN-191
45-BN-101 to 106	45-BN-192
45-BN-162 to 168	45-FR-20 to 23

Total = 32 sites in Secondary Impact Area
 Total below or at 400 ft = 32
 % of Total = 19

Secondary Impact Area (around margin of Reservoir area)

401 ft to 450 ft MSL

45-BN-149	45-GR-42
45-BN-151	45-GR-69
45-BN-158	45-GR-135-6
45-BN-179	45-GR-164
45-BN-180	45-GR-319
45-GR-41	45-GR-322

Total = 12 sites in Secondary Impact Area
 Total between 401 ft and 450 ft = 12
 % of Total = 7

TOTAL NUMBER OF SITES = 166 % of Total = 100

In Primary Impact Area, 122 -- In Secondary Impact Area, 32+12 = 44

RECOMMENDATIONS

If the Ben Franklin Dam alternative is adopted and the project receives authorization from Congress, additional cultural resource studies will be necessary. Even though it is likely that the majority of cultural resources within the impact area have been identified by reconnaissance studies there will be a need to conduct a more intensive survey to identify additional sites and to conduct subsurface evaluation of sites. Specific recommendations include the following:

1. A reconnaissance study is necessary to revisit identified sites and to identify remaining sites present. The main purpose of this study should be to prepare detailed site forms for all identified cultural resources and to mark site areas precisely on aerial photographs. A current assessment of site condition will be essential to suggest site evaluation techniques and data recovery requirements. Special attention should be given to the identification of historical sites since they were not emphasized in earlier studies.
2. An intensive survey should be conducted following the completion of reconnaissance work. The major importance of the survey should be to conduct subsurface test excavations at sites containing fill in order to assess the depth and character of cultural deposits. This work would provide a more substantive basis for the evaluation of sites, including the establishment of a more firm chronology and cultural sequence, and this information would lead to a more precise estimate of the labor required for site salvage. This step is essential to establish the priorities for future study.
3. An ethnographic place name study should be conducted within the project area in order to determine the existence of locations of special religious significance to local Native American peoples. The purpose of this study would be to preserve sites important to the religious expression of Indian peoples. It is anticipated that cemetery areas within the project area would be of a major concern of Indian peoples. It is the preference of local Indian peoples that these graves not be relocated, but maintained at their original sites. Historical fishing stations and caches are also of some concern to the Wanapam people pursuant to the American Indian Religious Freedom Act.
4. If mitigation by archaeological salvage is necessary no less than 20,000 person-days of labor will be required to recover field materials and another 40,000 to 60,000 person-days labor will be required to properly analyze and interpret the materials recovered for the public benefit.

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APPENDIX A

ARCHAEOLOGICAL COLLECTIONS FROM THE HANFORD REACH

Additional sources of information regarding the archaeology of the Hanford Reach of the Columbia River may be found by consulting the known collections gathered within that area. These collections and their present locations are listed as follows:

1. Archaeological collections gathered from the Hanford Reach by pre-Hanford Reservation settlers. These specimens are housed at Sacajawea State Park Museum near Pasco, Washington.
2. Archaeological collections gathered from Wahluke by H.W. Krieger in 1926-27. These artifacts are stored at the Smithsonian Institution, Museum of Natural History in Washington, D.C.
3. Archaeological collections gathered from the Washington Public Power Supply System Hanford Generating Plant (45-BN-179 and 45-BN-180) and the WNP-1 and 4 water intake (45-BN-257). These specimens are contained at the Laboratory of Anthropology at the University of Idaho, Moscow.
4. Archaeological collections gathered from the Hanford Reach at the time of the Ben Franklin Reservoir survey of 1967-68. These specimens are stored at the residence of Mr. Nick J. Paglieri, 1427 Duportail, Richland, Washington 99352 on behalf of the Mid-Columbia Archaeological Society.
5. Archaeological collections gathered from Vernita (45-BN-157) by the Mid-Columbia Archaeological Society. These specimens are stored at the residence of Mr. Kenneth Den Beste, Route 1, Box 211, Moxee, Washington 98936 on behalf of the Mid-Columbia Archaeological Society.
6. Archaeological collections gathered from the log structure at East White Bluffs landing (45-FR-266). These specimens are contained at the Laboratory of Anthropology at the University of Idaho, Moscow.

APPENDIX B

LIST OF PERSONS CONTACTED

The following individuals were contacted regarding the cultural resources assessment of the Hanford Reach of the Columbia River:

1. Mr. Hal Kennedy, Office of Public Archaeology, Institute of Environmental Studies, University of Washington, Seattle, Washington.
2. Mr. Lloyd Whelchel, Washington Archaeological Research Center, Pullman, Washington.
3. Ms. Shiela Stump, Washington State Office of Archaeology and Historic Preservation, Olympia, Washington.
4. Mr. N.G. Fuller, Site Facilities & Services Division, Richland Operations, U.S. Department of Energy, Richland, Washington.
5. Mr. Brit Storey, Advisory Council on Historic Preservation, Denver, Colorado.
6. Mr. Kenneth Den Beste, Mid-Columbia Archaeological Society, Moxee, Washington.
7. Mr. Nick J. Paglieri, Mid-Columbia Archaeological Society, Richland, Washington.
8. Mr. Joe Randolph, Bureau of Land Management, U.S. Department of the Interior, Spokane, Washington.

Agencies contacted by the U.S. Army Corps of Engineers regarding the effect of the Ben Franklin Dam alternative upon cultural resources include:

1. Mr. Frank Green, Washington State Historical Society, Tacoma, Washington.
2. Dr. Richard D. Daugherty, Washington Archaeological Research Center, Pullman, Washington.
3. Ms. Jeanne Welch, Deputy State Historic Preservation Officer, Office of Archaeology and Historic Preservation, Olympia, Washington.
4. Mr. Jerry Jermann, Office of Public Archaeology, Institute for Environmental Studies, University of Washington, Seattle, Washington.
5. Mr. Garland Gordon, Interagency Archaeological Services, Heritage Conservation and Recreation Service, U.S. Department of the Interior, San Francisco, California.
6. Mr. Louis Wall, Office of Review and Compliance, Advisory Council on Historic Preservation, Denver, Colorado.

APPENDIX C

SITES BY TYPE FOR PRIMARY AND SECONDARY IMPACT AREAS

Sites by Type--Primary Impact Area (* = Site has been tested)

Site Number	Open Campsite	Housepits	Ethnographic Campsite	Fishing Station	Flaking Floor	Historic Site	Drystone Wall	Burials
45BN35	X	-	-	-	-	-	-	-
45BN36	X	-	-	-	-	-	-	-
45BN37	-	-	-	-	-	-	-	-
45BN38	X	-	-	-	-	-	X	-
45BN39	X	-	-	-	-	-	-	-
45BN40	X	-	-	-	-	-	-	-
45BN41	-	X	-	-	-	-	-	-
45BN42	X	-	-	-	-	-	-	-
45BN90	X	-	-	-	-	-	-	-
45BN107	X	-	-	-	-	-	-	-
45BN108	X	X	-	-	-	-	-	-
45BN109	X	-	-	X	-	-	-	-
45BN110	X	-	-	-	-	-	-	-
45BN111	-	-	-	X	-	-	-	-
45BN112	-	-	-	X	-	-	-	-
45BN113	-	-	-	X	-	-	-	-
45BN114	-	-	-	X	-	-	-	-
45BN115	X	-	-	-	-	-	-	-
45BN116	X	-	-	-	-	-	-	-
45BN117	X	-	-	-	-	-	-	-
45BN118	X	X	-	-	-	-	-	-
45BN119	X	-	-	-	-	-	-	-
45BN120	X	-	-	-	-	-	-	-
45BN121	X	X	-	-	-	-	-	-
45BN122	X	-	-	-	-	-	-	-
45BN123	X	-	-	-	-	-	-	-
45BN124	-	-	-	-	-	-	-	X
45BN125	X	X	-	-	-	-	-	X
45BN126	X	-	-	X	-	-	-	-
45BN127	X	-	-	-	-	-	-	-
45BN128	-	-	-	-	-	-	-	X
45BN129	-	-	-	-	-	-	-	X
45BN130	X	-	-	X	-	-	-	-
45BN131	X	-	-	X	-	-	-	-
45BN132	X	-	-	-	-	-	-	-
45BN133	X	-	-	-	-	-	-	-
45BN134	X	X	-	-	-	-	-	-
45BN135	X	-	-	-	-	-	-	-
45BN136	X	-	-	-	-	-	-	-
45BN137	X	-	-	X	-	-	-	-
45BN138	X	-	-	-	-	-	-	-
45BN139	-	-	-	-	-	-	-	X
45BN140	X	-	-	-	-	-	-	-
45BN141	X	-	-	-	-	-	-	-
45BN142	X	X	-	X	-	-	-	X
45BN143	-	-	-	-	-	-	-	X

Sites by Type--Primary Impact Area (* = Site has been tested)

Site Number	Open Campsite	Housepits	Ethnographic Campsite	Fishing Station	Flaking Floor	Historic Site	Drystone Wall	Burials
Site Type								
45BN144	X	-	-	X	-	-	-	-
45BN145	X	-	X	-	-	-	-	-
45BN146	X	X	-	X	-	-	-	-
45BN147	X	X	-	-	-	-	-	-
45BN148	X	X	-	X	-	-	-	-
45BN149*	X	X	-	-	-	-	-	-
45BN150	X	X	-	-	-	-	-	-
45BN152	X	-	-	X	-	-	-	-
45BN153	X	X	-	-	-	-	-	-
45BN154	X	-	-	-	-	-	-	-
45BN155	X	-	-	-	-	-	-	-
45BN156	X	-	-	-	-	-	-	-
45BN157a*	X	X	X	X	-	-	-	-
45BN157b	X	-	X	X	-	-	-	-
45BN160a	X	-	-	-	-	-	-	-
45BN169	X	X	-	-	-	-	-	-
45BN176	X	X	-	X	-	-	-	-
45BN221	-	-	-	-	-	X	-	X
45BN222	X	-	-	X	-	-	-	-
45BN223	X	-	-	X	-	-	-	-
45BN224	X	-	-	X	-	-	-	-
45BN225	-	-	-	-	-	-	X	-
45BN226	X	-	-	X	-	-	-	-
45BN227	X	-	-	X	-	-	-	-
45BN228	X	-	-	X	-	-	-	-
45BN257*	X	-	-	-	-	-	-	-
45FR24	X	-	-	-	-	-	-	-
45FR25	X	-	-	-	-	-	-	-
45FR26	X	-	-	-	-	-	-	-
45FR27	X	-	-	-	-	-	-	-
45FR251	X	-	-	X	-	-	-	-
45FR252	X	-	-	-	-	-	-	-
45FR253	X	-	-	X	-	-	-	-
45FR254	X	-	-	-	-	-	-	-
45FR255	X	X	-	X	-	-	-	-
45FR256	X	-	-	X	-	-	-	-
45FR257	X	-	-	X	-	-	-	-
45FR258	X	-	-	X	-	-	-	X
45FR259	X	-	-	X	-	-	-	-
45FR260	X	-	-	X	-	-	-	-
45FR261	X	-	-	-	-	-	-	-
45FR262	X	-	-	X	-	-	-	-
45FR263	X	-	-	-	-	-	-	-
45FR264	X	-	-	-	-	-	-	-
45FR265	X	-	-	-	-	-	-	-
45FR266	X	-	-	-	-	X	-	-

Sites by Type--Primary Impact Area (* = Site has been tested)

Site Number	Open Campsite	Housepits	Ethnographic Campsite	Fishing Station	Flaking Floor	Historic Site	Drystone Wall	Burials
Site Type								
45FR286	X	-	-	-	-	-	-	-
45GR301	X	-	-	-	-	-	-	-
45GR302a*	X	X	-	X	-	-	-	-
45GR302b	X	X	-	X	-	-	-	-
45GR302c	X	-	-	X	-	-	-	X
45GR303	X	-	-	-	-	-	-	-
45GR304	X	-	-	-	-	-	-	-
45GR305	X	X	-	-	-	-	-	-
45GR306a	X	-	-	X	-	-	-	-
45GR306b*	X	X	-	X	-	-	-	-
45GR306c	-	-	-	-	-	-	-	X
45GR307	X	-	-	X	-	-	-	-
45GR308	X	-	-	X	-	-	-	-
45GR309	X	-	-	X	-	-	-	-
45GR310	X	-	-	-	-	-	-	-
45GR311	X	-	-	-	-	-	-	-
45GR312	X	-	-	-	-	-	-	-
45GR313	X	-	-	-	-	-	-	-
45GR314	X	-	-	X	-	-	-	-
45GR315	X	X	-	X	-	-	-	-
45GR316*	X	-	-	X	-	-	-	-
45GR317	X	X	-	X	-	-	-	X
45GR318	X	-	-	-	-	-	-	-
45GR320	X	-	-	-	-	-	-	-
45GR321	X	-	-	-	-	-	-	-
45GR323	-	-	-	-	X	-	-	-
45GR324	-	-	-	-	X	-	-	-
45GR326	X	-	-	-	-	-	-	-
45YK58	X	-	-	-	-	-	-	-
45YK151	X	-	-	-	-	-	-	-
45YK153	X	X	-	-	-	-	-	-
TOTALS	107	24	3	44	2	2	2	12

Sites by Type--Secondary Impact Areas (* = Site has been tested)

Site Number	Open Campsite	Housepits	Ethnographic Campsite	Fishing Station	Flaking Floor	Historic Site	Drystone Wall	Burials
	Site Type							
45BN26	X	-	-	-	-	-	-	-
45BN27	X	-	-	-	-	-	-	-
45BN28	X	-	-	-	-	-	-	-
45BN29	X	-	-	-	-	-	-	-
45BN30	X	-	-	-	-	-	-	-
45BN31	-	X	-	-	-	-	-	-
45BN32	-	X	-	-	-	-	-	-
45BN33	X	-	-	-	-	-	-	-
45BN34	X	-	-	-	-	-	-	-
45BN43	X	-	-	-	-	-	-	-
45BN44	X	-	-	-	-	-	-	-
45BN45	-	X	-	-	-	-	-	-
45BN101	X	-	-	X	-	-	-	-
45BN102	X	-	-	X	-	-	-	-
45BN103	X	-	-	X	-	-	-	-
45BN104	X	X	-	X	-	-	-	-
45BN105	X	X	-	X	-	-	-	-
45BN106	X	-	-	X	-	-	-	-
45BN149	X	X	-	-	-	-	-	-
45BN151	-	-	-	-	-	-	-	X
45BN158	X	-	-	-	-	-	-	-
45BN162	X	-	-	X	-	-	-	-
45BN163	X	X	-	X	-	-	-	-
45BN164	X	-	X	X	X	-	-	-
45BN165	-	-	-	X	-	-	-	-
45BN166	X	-	-	X	-	-	-	-
45BN167	X	X	-	X	X	-	-	-
45BN168	X	X	-	X	-	-	-	-
45BN179*	X	-	-	-	-	-	-	-
45BN180*	-	X	-	-	-	-	-	-
45BN186	-	-	-	-	-	-	-	X
45BN191	X	-	-	-	-	-	-	-
45BN192	X	-	-	-	-	-	-	-
45FR20	X	-	-	-	-	-	-	-
45FR21	X	-	-	-	-	-	-	-
45FR22	X	-	-	-	-	-	-	-
45FR23	X	-	-	-	-	-	-	-
45GR41	X	X	-	-	-	-	-	-
45GR42	X	-	-	-	-	-	-	-
45GR69	-	-	-	-	-	-	-	X
45GR135	X	X	-	-	-	-	-	-
45GR136	X	X	-	-	-	-	-	-
45GR164	-	-	-	-	X	-	-	-
45GR319	X	-	-	-	-	-	-	-
45GR322	-	-	-	X	X	-	-	-
TOTALS	35	13	1	14	4	0	0	3